The US Army's Center for Strategy and Force Evaluation

STUDY REPORT
CAA-SR-93-7

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RENEWABLES AND ENERGY EFFICIENCY PLANNING STUDY (REEP)

AUGUST 1993

CONCEPTS ANALYSIS AGENCY
UNITED STATES ARMY

PREPARED BY
FORCE SYSTEMS DIRECTORATE

US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814-2797

CAA

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Director
US Army Concepts Analysis Agency
ATTN: CSCA-FS
8120 Woodmont Avenue
Bethesda, MD 20814-2797

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13. ABSTRACT (Maximum 200 words)

The purpose of the REEP Study was to develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy at Army facilities. The methodology provides a logical framework for integrating and analyzing US energy and environmental policy, Army energy and environmental goals, Army programming and budgeting, and public and private sector funding. The core of the REEP methodology is a multiobjective mathematical programming model that can quickly generate and analyze optimal renewable energy and energy efficiency investment strategies for Army facilities on an annual basis through FY 2005. The model maximizes cost, energy, load, and pollutant savings for individual or combinations of renewable and conservation investments while explicitly considering budget constraints, energy and environmental goals, and economies of scale. REEP was sponsored by the US Army Chief of Engineers.

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STUDY REPORT
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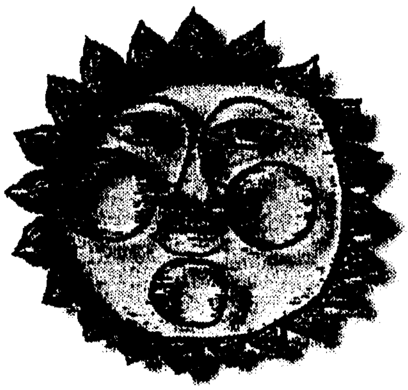
Renewables and Energy Efficiency Planning Study (REEP)



August 1993

Prepared by
Force Systems Directorate
Mr. Steven B. Siegel, Study Director

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland, 20814-2797

DEPARTMENT OF THE ARMY
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814-2797

REPLY TO
ATTENTION OF:
CSCA-FSR

01 FEB 1994

MEMORANDUM FOR

Assistant Chief of Staff for Installation Management, Attn: DAIM-FDF, Washington, DC 20310-2600

U.S. Army Corps of Engineers, Office of Strategic Initiatives, Attn: CESI, 20 Massachusetts Avenue NW, Washington, DC 20314-1000

SUBJECT: Renewables and Energy Efficiency Planning Study (REEP)

1. Reference memorandum, CEHSC-FU-M, 1 June 1992, subject: Renewables and Energy Efficiency Planning Study (REEP) - Study Directive.

2. Referenced memorandum requested that the U.S. Army Concepts Analysis Agency (CAA) develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy in Army facilities.

3. This final report documents the results of our analysis and incorporates your comments on the final draft report received 29 December 1993. The methodology provides a logical framework for integrating and analyzing U.S. energy and environmental policy, Army energy and environmental goals, Army programming and budgeting, and public and private sector funding. The core of the REEP methodology is a multiobjective mathematical programming model that can quickly generate and analyze optimal renewable energy and energy efficiency investment strategies for Army facilities on an annual basis through FY 2005. The model maximizes cost, energy, load, and pollutant savings for individual or combinations of renewable and conservation investments while explicitly considering budget constraints, energy and environmental goals, and economies of scale. The executive summary found in the report provides an overview of the entire study.

4. CAA expresses appreciation to all staff elements and agencies which have contributed to this study. Questions and/or inquiries should be directed to the Assistant Director, Force Systems Directorate, U.S. Army Concepts Analysis Agency, 8120 Woodmont Avenue, Bethesda, MD 20814-2797, DSN 295-5289.

Daniel Shedlowski
for E. B. VANDIVER III
Director

CAA (logo)	RENEWABLE AND ENERGY EFFICIENCY PLANNING (REEP) STUDY	STUDY SUMMARY CAA-SR-93-7

THE REASON FOR PERFORMING THIS STUDY was to develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy at Army facilities.

THE SPONSORS were the Assistant Chief of Engineers, Department of the Army, and the Associate Chief of Engineers for Strategic Initiatives, US Army Corps of Engineers.

THE OBJECTIVES were to:

(1) Estimate the energy and cost savings that could result from economic investment in energy efficiency and renewable energy in Army facilities at selected sites.

(2) Estimate the costs associated with the economic investment in renewable energy and efficiency in Army facilities.

(3) Identify potential sources of funding for energy efficiency and renewable energy investment in Army facilities.

(4) Develop and evaluate investment strategy alternatives for undertaking economic investment in Army facilities.

THE SCOPE OF THE STUDY was:

(1) The timeframe of the analysis was fiscal year (FY) 1994 - FY 2005. Initially, the analysis was to address the period FY 1993 - FY 2010. However, with the passage of the Energy Policy Act of 1992 (EPACT), emphasis shifted to an energy conservation opportunity (ECO) investment strategy for the period FY 1994 - FY 2005.

(2) The study considered 49 US Army facilities in the continental United States (CONUS) with annual utility bills greater than $5 million.

(3) The study considered renewable energy and energy efficiency technologies and measures that were in the research, development, demonstration, and commercialization phases of the product life cycle.

(4) The study examined application of ECO retrofit measures only.

(5) Both public and private sector funding sources were examined for ECO investment.

THE APPROACH used in the study was to first estimate the amount of commercially available energy efficiency and renewable energy investment for retrofit applications that would be economically feasible at 49 major Army sites in CONUS. A multiobjective mathematical programming model was then developed that quickly generates and analyzes optimal energy efficient and renewable energy investment strategy for Army facilities on an annual basis through FY 2005. The REEP methodology was demonstrated in support of the Army response to key provisions of the recently enacted Energy Policy Act.

THE PRINCIPAL FINDINGS AND IMPLICATIONS OF THIS STUDY were that:

(1) The REEP methodology provides a logical approach for analyzing and integrating US energy and environmental policy, Army energy and environmental goals, Army programming and budgeting, and public and private sector funding. It provides Army energy decisionmakers

and policy analysts with a much needed capability to more accurately and responsively develop and evaluate energy investment programs that are analytically defensible and credible. The methodology is inherently flexible and transferable such that it can readily incorporate changes in data and analytic tools.

(2) The economic potential for investment in 47 ECO at 49 major US Army facilities in CONUS is 16,823,804 millions of British thermal units (Mbtu) of annual energy reduction, 724,128 kilowatts (kW) of demand reduction, $249.446,020 of annual cost savings, and 2,415,337 short tons (STON) of annual pollution reduction. This potential must be captured as a requirement of EPACT which mandates all ECO with paybacks of 10 years or less be implemented at Federal facilities by 2005. The 49 facilities consume about three-quarters of the energy consumed at CONUS facilities or approximately one-half of facility energy usage Armywide. It is likely that much of this potential would be transferable to most of the other sites in the Army, since the ECO identified are commercially available and largely standard.

(3) The annual cost savings of $249,446,020 generated from implementing the 47 ECO at the 49 sites provides direct economic benefits to both Army installations and the US Treasury. This occurs because Army policy requires one-third of the cost savings to be reinvested in additional ECO, one-third to be invested in installation quality of life measures (which could also be additional ECO), and one-third to the US Treasury. This policy further supports the EPACT provision requiring reinvestment of ECO cost savings. Cost savings accrued from these ECO not only pay for themselves, but additionally serve as a source of revenue that could be used for other applications, such as reducing the Federal budget deficit. Utilities and their customers would also benefit in that the need for expensive new plant construction could be deferred.

(4) Approximately 19 percent of the annual energy savings produced by the ECO is attributable to reduced oil consumption at Army facilities and servicing electric utilities. This decrease in oil use equates to about 503,598 barrels per year. Currently, about 42 percent of oil products supplied in the US is imported. Applying this percentage to the oil savings calculated for the 47 ECO at the 49 CONUS sites, 211,511 less barrels of oil would need to be imported if all the ECO were implemented. Reducing oil imports directly contributes to a reduction in the US trade deficit. It also strengthens national security by reducing US dependence on potentially unstable foreign sources of energy. Decreasing US dependence on oil imports also contributes to reducing the US military's requirements for protecting the supply routes used to import oil.

(5) The reduction in annual pollutant emissions of 2,415,337 STON resulting from ECO implementation provides significant environmental and health benefits to the populations of the 49 facilities and nearby communities (including those near the servicing utilities). Pollution abatement also generates considerable economic benefits, such as a decrease in cost requirements for cleaning up polluted air and water resources "after the fact." Other examples of monetary benefits from pollution reduction include decreases in both health care costs and the costs utilities incur in meeting environmental standards prescribed by law.

(6) The 47 ECO evaluated in this study constitute a sample of the technologies that could substantially reduce Army energy consumption, save dollars, and reduce pollutant emissions. Other available opportunities include water conservation technologies, which are now regarded as energy conservation opportunities per direction from EPACT; new building construction in addition to retrofit applications examined in this study; and increased investment in energy efficiency and renewables beyond the ECO identified in this study.

THE STUDY EFFORT was directed by Mr. Steven B. Siegel, Force Systems Directorate, US Army Concepts Analysis Agency (CAA).

COMMENTS AND QUESTIONS should be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FSR, 8120 Woodmont Avenue, Bethesda, MD 20814-2797.

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RENEWABLES AND ENERGY EFFICIENCY PLANNING (REEP) STUDY

CHAPTER 1

EXECUTIVE SUMMARY

1-1. PURPOSE. The purpose of the Renewables and Energy Efficiency Planning (REEP) Study was to develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy at Army facilities.

1-2. BACKGROUND

a. The Army requires a quick turnaround decision support capability that can evaluate renewable energy and energy efficiency investment issues. The requirement for this capability is based upon the increasingly complex nature of analyzing the potential for renewable energy and energy efficiency in the Army when considering factors such as energy system costs and performance, policy requirements, alternative sources of funding, budget constraints, the industrial base, environmental considerations, and institutional characteristics. An analytical methodology that could logically incorporate these factors in support of the energy investment decisionmaking process in the Army was developed and applied in the study.

b. The Energy Policy Act of 1992 (P.L. 102-486) (EPACT) was enacted to increase the use of renewable energy and energy efficiency in the industrial, commercial, residential, and Federal sectors of the economy. Key provisions in the Act require:

- All energy efficiency and renewable energy measures in Federal facilities that have a payback of 10 years or less be implemented by 2005, and
- The reduction in energy use per square foot by 20 percent during the period 1985-2000 (same as Executive Order 12759, 17 April 1991) for Federal buildings and facilities.

Other EPACT provisions that affect renewable energy and energy efficiency investment in the Army are the increasing use of energy performance contracts, participation in utility demand side management programs, and reducing pollutant emissions due to energy production. Subsequent to the enactment of EPACT (which occurred about midway through the study), evaluating the feasibility of using the REEP methodology to address the provisions of EPACT became a high priority of the study.

c. Study Sponsors. The Assistant Chief of Engineers, Department of the Army, and the Associate Chief of Engineers for Strategic Initiatives, United States (US) Army Corps of Engineers, are the study sponsors (REEP study directive included at Appendix B).

1-3. SCOPE. The fundamental scope of REEP is outlined below. More specific parameters and assumptions are identified in Chapter 3 with the various case analyses in which they apply.

a. The timeframe of the analysis was fiscal year (FY) 1994-FY 2005. Initially, the analysis was to address the period FY 1993-FY 2010. However, with the passage of EPACT, emphasis shifted to analyzing energy conservation opportunity (ECO) investment strategy for the period FY 1994-FY 2005.

b. The study considered 49 US Army facilities in the continental United States (CONUS) with annual utility bills greater than $5 million.

c. The study considered renewable energy and energy efficiency technologies and measures that were in the research, development, demonstration, and commercialization phases of the product life cycle.

d. The study examined application of ECO retrofit measures only.

e. Both public and private sector funding sources were examined for ECO investment.

1-4. OBJECTIVES

a. Estimate the energy and cost savings that could result from economic investment in energy efficiency and renewable energy in Army facilities at selected sites.

b. Estimate the costs associated with the economic investment in renewable energy and efficiency in Army facilities.

c. Identify potential sources of funding for energy efficiency and renewable energy investment in Army facilities.

d. Develop and evaluate investment strategy alternatives for undertaking economic investment in Army facilities.

1-5. METHODOLOGY

a. Overview. The methodology used to conduct the REEP Study is illustrated by Figure 1-1. This methodology was designed for developing and evaluating optimal ECO investment strategies in the Army. The methodology provides an integrated engineering, financial, and economic approach for addressing the major issues associated with the formulation and analysis of these strategies. The ordering of the tasks indicates the general sequence of task execution. In some cases, tasks were performed simultaneously. For example, Task 1--which involved the identification and evaluation of ECO--was conducted throughout the study.

b. Task 1--Estimate Remaining Economic Potential of ECO. This task first entailed estimating the amount of commercially available ECO investment for retrofit applications that were technically feasible at 49 major Army sites in CONUS. The term "ECO" is defined in this study to include both energy efficiency and renewable energy technologies. Detailed site-specific ECO characteristics such as investment costs, energy, demand and cost savings, and reductions in pollutant emissions were developed by the US Army Construction Engineering Research Laboratory (CERL) for all ECO. From these technically feasible ECO, economically feasible ECO were then specified using a 10-year simple payback (per EPACT). Other criteria (e.g., net present value) for determining economic feasibility could be used depending upon the context of the analysis. The total number of existing economically feasible ECO were adjusted using market penetration surveys of Army energy experts to determine the amount of ECO investment already implemented. The cost, energy, and demand savings and pollutant reduction that would result from investing in ECO that have not been implemented to date constituted the remaining economic potential.

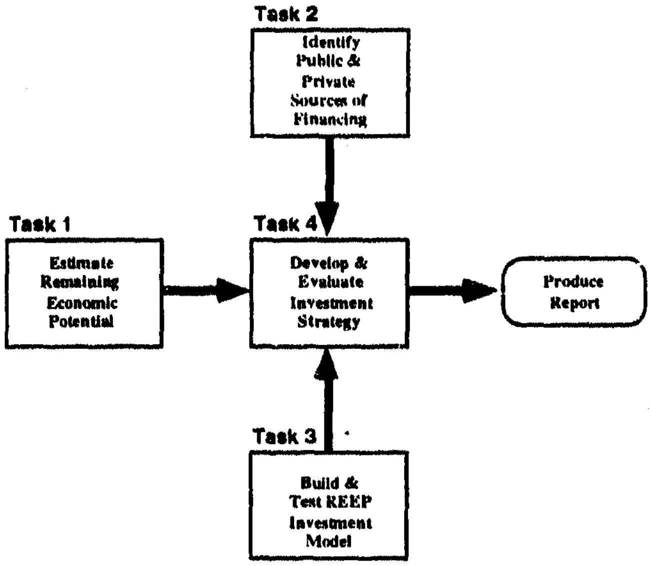

Figure 1-1. REEP Methodology

c. Task 2--Identify and Describe Sources of Financing. This task identified and described potential sources of funds for investment in Army ECO. Sources of ECO finance that were examined included governmental programs as well as private institutions such as utilities and energy service companies. The principal purpose of this task was to identify the terms and conditions (such as dollar limitations and required payback periods) of using the different potential funding sources for ECO investment. The terms and conditions identified were then used to formulate budget constraints required by the investment model developed in Task 3.

d. Task 3--Build and Test a REEP Investment Model (RIM). This task involved designing, building, and testing a multiobjective linear programming model--RIM. The model maximizes cost, energy, and load savings and pollutant reduction for individual or combinations of renewable and conservation investments, while explicitly considering budget constraints, energy and environmental goals, and economies of scale. RIM develops and analyzes optimal renewable energy and energy efficiency investment strategies at US Army facilities on an annual basis (i.e., what to buy, how many, where, and when).

e. Task 4--Develop and Evaluate Investment Strategy. This task demonstrated and applied RIM to a variety of policy and programmatic issues. The principal issues that were evaluated included:

- What should the investment strategy be for a sample of 16 ECO specified at US Army facilities in CONUS that maximizes cost savings and can be implemented completely by FY 2005?

- What should the investment strategy be for 47 ECO specified at US Army facilities in CONUS that maximizes cost savings and can be implemented completely by FY 2005?

The last issue served as a "base case," since it considered the total number of economically feasible ECO identified in the REEP Study and is in accordance with EPACT and Army energy policy.

1–6. FINDINGS AND IMPLICATIONS. The benefits to be derived in using the REEP methodology for energy policy management and planning are illustrated in Figure 1-2. The methodology utilizes an operations research/systems analysis approach for evaluating and implementing National, DOD and Army energy policy. It does this through an optimization process, producing energy conservation and renewable energy investment strategies that yield the most "benefit" possible (such as improving the environment) given a set of resource constraints and policy goals and requirements. This section discusses and highlights six major findings and implications resulting from the development and application of the REEP methodology in this study.

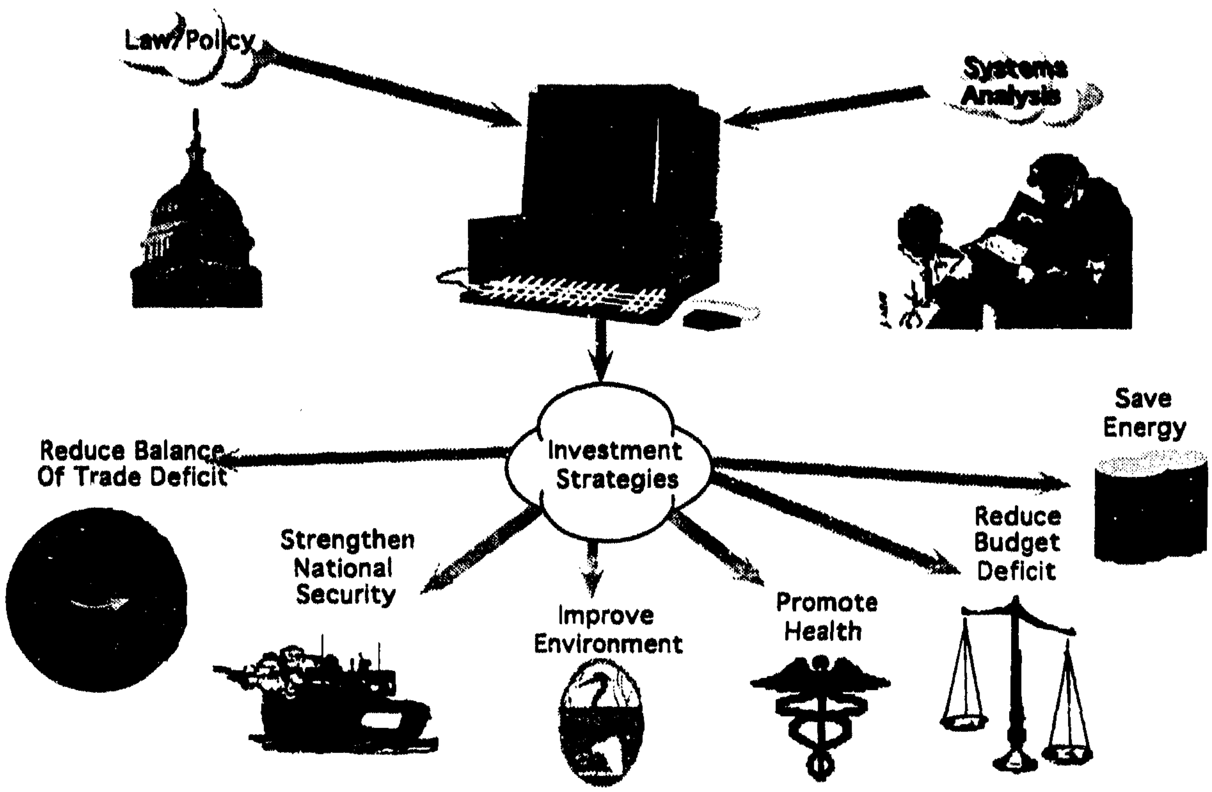

Figure 1–2. Major Benefits Derived from Using REEP Methodology

a. The REEP methodology provides a logical approach for analyzing and integrating US energy and environmental policy, Army energy and environmental goals, Army programming and budgeting, and public and private sector funding. It provides Army energy decisionmakers and policy analysts with a much needed capability to more accurately and responsively develop and evaluate energy investment programs that are analytically defensible and credible. The methodology is inherently flexible and transferable such that it can readily incorporate changes in policy, data, and analytic tools.

b. The economic potential for investment in 47 ECO at 49 major US Army facilities in CONUS is 16,823,804 millions of British thermal units (Mbtu) of annual energy reduction, 724,128 kilowatts (kW) of demand reduction, $249,446,020 of annual cost savings, and 2,415,337 short tons (STON) of annual pollution reduction. This potential must be captured as a requirement of EPACT which mandates all ECO with paybacks of 10 years or less be implemented at Federal facilities by 2005. The 49 facilities consume about three–quarters of

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d. Approximately 19 percent of the annual energy savings produced by the ECO is attributable to reduced oil consumption at Army facilities and servicing electric utilities. This decrease in oil use equates to about 503,598 barrels per year. Currently, about 42 percent of oil products supplied in the US is imported.* Applying this percentage to the oil savings calculated for the 47 ECO at the 49 CONUS sites, 211,511 less barrels of oil would need to be imported if all the ECO were implemented. Reducing oil imports directly contributes to a reduction in the US trade deficit. It also strengthens national security by reducing US dependence on potentially unstable foreign sources of energy. Decreasing US dependence on oil imports also contributes to reducing the US military's requirements for protecting the supply routes used to import oil.

e. The reduction in annual pollutant emissions of 2,415,337 STON resulting from ECO implementation provides significant environmental and health benefits to the populations of the 49 facilities and nearby communities (including those near the servicing utilities). Pollution abatement also generates considerable economic benefits, such as a decrease in cost requirements for cleaning up polluted air and water resources "after the fact." Other examples of monetary benefits from pollution reduction include decreases in both health care costs and the costs utilities incur in meeting environmental standards prescribed by law.

f. The 47 ECO evaluated in this study constitute a sample of the technologies that could substantially reduce Army energy consumption, save dollars, and reduce pollutant emissions. Other available opportunities include water conservation technologies, which are now regarded as energy conservation opportunities per direction from EPACT; new building construction in addition to retrofit applications examined in this study; and increased investment in energy efficiency and renewables beyond the ECO identified in this study. These additional ECO should be analyzed and adopted in the Army as appropriate.

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* First quarter, 1993. Source: Energy Information Administration, *Monthly Energy Review*, June 1993, Table 1.8.

CHAPTER 2

REEP METHODOLOGY

2-1. INTRODUCTION

a. A primary objective of this study was to develop and demonstrate a methodology to use in formulating and evaluating ECO investment strategies in the Army. An integrated engineering, financial, and economic approach was developed to address major issues involved in developing and assessing these strategies. The four tasks that compose the methodology are illustrated in Figure 2-1. Since a large portion of these tasks involved progressive work, it was necessary to continuously examine each task thoroughly to gauge impacts upon other components of the study. Task 1 established the opportunities for investment in energy efficiency and renewables at major energy consuming Army facilities in CONUS. Potential funding sources for these opportunities were identified and described in Task 2. Task 3 involved designing, developing, and testing a model that determined the optimum methods (and economic impacts) for investing in these opportunities over time. In Task 4, the methodology was applied to address selected energy related issues that arose during the course of the study.

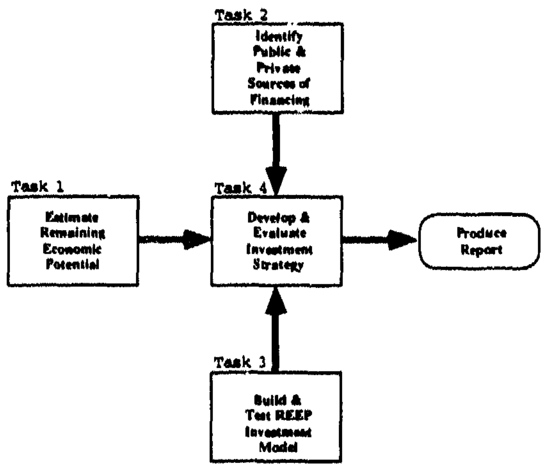

Figure 2-1. REEP Methodology

b. The four tasks in the methodology were essentially performed in the sequence order depicted in Figure 2-1. However, there was a "moving train" aspect to each task, such that many of the individual task efforts were conducted concurrently. That is, as more extensive and refined data or methodological improvements were identified, they were incorporated into the methodology and applied during subsequent analysis. This was especially the case for Task 1, in which ECO were continuously identified, developed, and evaluated throughout the study. This chapter discusses the individual tasks accomplished in developing the methodology used to perform the REEP Study.

2-2. TASK 1 - ESTIMATE REMAINING ECONOMIC POTENTIAL

a. General. Task 1 was organized into three subtasks--identify economically feasible ECO, estimate ECO energy, demand, cost savings, and pollution reduction by building category, and estimate ECO market captured to date. The engineering analysis conducted in the first two subtasks was conducted by CERL engineers.

b. Identify Economically Feasible ECO. Economically feasible ECO were identified using three principal selection criteria. First, an ECO had to be commercially available. This included "off the shelf" ECO technologies that were already available in the marketplace or which, if purchased in large enough quantities, would become available in the marketplace. The second selection criterion was the ability for broad application. ECO examined in the REEP Study were to be installed in Army facilities across CONUS. Thus, the study team wanted to compile a list of ECO whose technology was easily adaptable to and replicable in a variety of installations. This broad applicability of ECO technology would help the REEP Study account for as much economic potential as possible. The third criterion was established, given the passage of EPACT, which requires Army investment in all ECO with paybacks of 10 years or less by the year 2005. As a result of this requirement, the REEP Study focused on identifying and evaluating ECO with paybacks of 10 years or less. By the end of this study, CERL and CAA had identified 47 ECO that met all three criteria.

c. Estimate ECO Energy, Demand, and Cost Savings by Building Category. In making energy, demand, and cost saving estimates, CERL considered the types of buildings existing on Army facilities. This was necessary for two reasons. First, not all ECO can be applied to all types of buildings. While it is practical to install occupancy sensors in administration buildings, it may not be in barracks. Secondly, different building types can have large variations in the type and level of energy consumption. Other factors which had to be considered by CERL in making their estimates included the number of buildings at an installation, building size, and building function. Ten building categories* were used to classify standard functions of buildings found across Army facilities. These categories are listed in Figure 2–2. This allowed the engineering data to be specified in terms of ECO type and building category (e.g., energy efficient lighting in family housing would be evaluated as a distinct opportunity). Using this approach, much of the data (e.g., technical performance) developed for an ECO in a particular building category could be applied to different facilities that included the building category specified.

Training	Administration
Maintenance and production	Unaccompanied personnel housing
Research, development, and testing	Community
Storage	Family housing
Hospital and medical	Other

Figure 2–2. Building Categories

d. Estimate ECO Market Captured to Date. To estimate the remaining economic potential of the ECO identified, it was first necessary to determine the amount of ECO investment implemented to date. Given the difficulty of obtaining historical market share data, CAA in conjunction with the sponsors and CERL, believed that the most knowledgeable source of information concerning present ECO market penetration would be Army engineers, logisticians, facility managers, and other experts who had approximately 30 years of experience in the field. A survey questionnaire was administered to these experts requesting data on the current penetration of each ECO at US Army facilities in CONUS. The results of this survey are presented in Chapter 3. Survey estimates were utilized to establish the remaining economic potential of the ECO.

* The 10 building categories were derived from AR 415-28, Department of the Army Facility Classes and Construction Categories (Category Codes), November 1981.

2–3. TASK 2 - IDENTIFY AND DESCRIBE SOURCES OF FINANCE

a. This task identified and described potential funding sources for investment in Army ECO. The principal reason for performing this task was to determine the basic terms and conditions for accessing these financial sources and to assess potential fund availability for developing budget parameters and model constraints. The intent was to allow the model to select the budget source that would best suit investment in certain types and quantities of ECO. An example would be for the model to utilize a well-endowed finance source for ECO requiring a large investment. This task was also important in gaining a fundamental understanding of the finance sources.

b. Sources of potential ECO finance that were examined included governmental programs, as well as private institutions, such as utilities and energy service companies. As a result, a wide variety of data sources was identified including Army agencies, Office of the Secretary of Defense (OSD), Department of Energy (DOE), nonprofit organizations, and utilities. A myriad of regulations, directives, reports, letters, and legislation were reviewed as part of this research. An additional objective of Task 2 was to gain an appreciation of the Army's experience in using the different finance sources to help identify their relative strengths and weaknesses. Because of the amount of information collected in this task, the results are presented in Appendix F, with an overview presented in Chapter 3.

2–4. TASK 3 - BUILD AND TEST REEP INVESTMENT MODEL (RIM)

a. This task constituted the core of the REEP methodology--the development of RIM. RIM is a multiobjective mathematical programming model that can generate and analyze optimal renewable energy and energy efficiency investment strategies at US Army facilities on an annual basis (i.e., what to buy, how many, where, and when). The model maximizes cost, energy, and demand savings and pollutant reduction that result from ECO investment.

b. Cost savings refers to the dollars saved by ECO implementation. Dollar savings occur because ECO decrease energy consumption (and sometimes electricity demand requirements), resulting in less dollar expenditures for energy. Energy savings are the amount of decreased energy consumption obtained through ECO implementation and are measured in Mbtu. Electrical demand refers to the amount of power required for an electrical device to operate and is measured in terms of kW. Pollutant reduction refers to the decrease in atmospheric pollutant emissions achieved by ECO implementation. This reduction occurs because decreased energy consumption causes utilities to burn less fuel (especially fossil fuels) to produce less energy. Pollutant reductions are measured in terms of STON.

c. The budget constraint is established by the amount of funds available for ECO investment in a given fiscal year. More than one budget constraint can be considered in cases when more than one source of available funds can be articulated. In general, budget constraints are set by Army programming policy and Congressional appropriation. ECO investment cannot exceed available funds (as established by the budget constraint) in any fiscal year. The budget constraint variable is determined outside RIM. Quantifiable energy and environmental goals are also regarded as constraints in the model, if they are requirements that must be achieved. An example of a quantifiable energy goal would be the requirement established in Executive Order 12759 that energy consumption at Federal facilities must decrease by 20 percent between FY 1985 and FY 2000.

d. During the initial phase of the study, the types of data output required from RIM were developed. This initial list of generalized data outputs served as a point of departure in the development of a list of generalized data inputs for the model (see Table 2–1). As the logic of RIM developed, the specific data inputs required to run the model were also identified. Once the

data input requirements were specified, likely sources of these data were identified. Tasks 1 and 2 involved the collection and development of the data necessary for RIM. Chapter 3 addresses the actual data used (and their sources) to run the model and the resulting data outputs.

Table 2-1. RIM Data Inputs and Outputs

Inputs	Outputs[a]
Budgets	Investment strategy decisions (quantity, type, time, and place)
Fuel prices	Investment strategy costs
Rollover rates	Annual and total cost savings (in dollars)
Rebates	Annual and total energy savings (in Mbtus)
Investment criteria	Annual and total demand savings (kilowatts)
Economies of scale	Annual and total pollutant reduction (in short tons)
ECO penetration	

[a]Outputs can be presented in terms of CONUS, major Army command (MACOM), state/region, or building category.

2-5. TASK 4 - DEVELOP AND EVALUATE INVESTMENT STRATEGY. The purpose of this task was to apply the REEP methodology to develop and evaluate ECO investment strategies for Army facilities in CONUS. By formulating a strategy, the capabilities of RIM for use in making ECO investment decisions would be demonstrated. A base case scenario was developed that incorporated Army policy and Federal mandates. For example, a key component of Army policy included in the base case is its allowance of one-third of the cost savings accrued through prior ECO investment to be used for purchasing additional ECOs in the following years. Federal mandates emanated from EPACT. A key provision of this act was that all ECO with paybacks of 10 years or less must be implemented at Federal agencies by 2005. To further display the capabilities of RIM, alternative scenarios which addressed important aspects of energy and environmental issues were derived. These scenarios included variations in the number of ECO considered, differing rollover rates, and the grouping of sites for a given region. Several of these scenarios were developed for the Renewable and Energy Efficiency Sustainable Investment (REESIN) Quick Reaction Analysis (QRA) and are documented in a separate report.

CHAPTER 3

ANALYSIS AND RESULTS

3–1. INTRODUCTION. Chapter 3 presents the results of executing the REEP methodology (see Figure 2–1) during the course of the study period. The utility of the methodology is highlighted by its flexibility, in that it can readily incorporate changes and improvements in data and analytical tools. Therefore, to sustain the integrity of REEP analysis in the future, the data bases and models that currently support the methodology should be updated and refined as required. This chapter first provides an overview of Tasks 1, 2, and 3; and then describes two applications of Task 4. Detailed documentation of the engineering analysis portion of Task 1 is provided in a separate report prepared by CERL. The outcome of Task 2 is more fully discussed in Appendix F. The technical and operational characteristics of RIM (Task 3) are described in Appendices D and E.

3–2. ESTIMATE REMAINING ECONOMIC POTENTIAL (TASK 1). The objective of Task 1 was to identify economically feasible ECO among major US Army facilities in CONUS and estimate the energy, demand, and cost savings and pollutant reduction that would result from implementation of the identified ECO. This task was organized into three subtasks: identify economically feasible ECO; estimate ECO energy, demand, and cost savings by building category; and estimate ECO market captured to date. The energy, demand, and cost savings and pollutant reduction associated with economically feasible ECO constitute the economic potential of the devices.

a. Identify Economically Feasible ECO. Not all of the renewable energy and energy conservation investment that is technically feasible is economic. For the purpose of this study, an ECO was considered economically feasible if its calculated simple payback was 10 years or less. This investment criterion was based on the provision established by EPACT requiring all ECO identified in the Federal government with paybacks of 10 years or less be acquired by 2005. An initial list of ECO was jointly developed by CAA and CERL analysts. This list was further evaluated by CERL engineers to develop a list of 47 ECO that would pay back in 10 years or less at a major energy-consuming CONUS site. A facility was considered a major energy consumer if its annual utility bill was greater than $5 million. In CONUS, 50 US Army sites met this criterion. The Presidio at San Francisco was not considered in this study given the Base Realignment and Closure (BRAC) Commission decision of 1991 to close this facility—leaving 49 sites (see Figure 3–1). Other ECO with paybacks greater than 10 years were identified by CERL, but were not considered in this study. The 47 ECO developed and evaluated for this study are shown in Figure 3–2.

Ft Bragg	Ft McPherson	Ft Gordon	Corpus Christi	Detroit Ars
Ft Campbel	Ft Meade	Ft Huachuca	Pine Bluff	Ft Monmouth
Ft Carson	Ft Ord	Ft Jackson	Pueblo	Redstone Ars
Ft Devens	Ft Polk	Ft Knox	Red River Dpt	Aberdeen PG
Ft Drum	Ft Riley	Ft Leavenworth	Rock Island Ars	Picatinny Ars
Ft Hood	Ft Stewart	Ft Lee	Tooele Dpt	White Sands
Ft Sam Houston	Ft Benning	Ft Rucker	Watervliet Ars	Ft Detrick
Ft Irwin	Ft Bliss	Ft Sill	Holston AAP	WRAMC
Ft Lewis	Ft Dix	Ft Leonard Wood	Lake City AAP	Ft Belvoir
Ft McCoy	Ft Eustis	Anniston Dpt	Radford AAP	

Figure 3–1. REEP Installations

Lighting	**Envelope**
2x4 fluorescent lighting retrofit	Radiant barriers
Compact fluorescent retrofit	High reflectance roof surface
Exit lighting retrofit	Window films
Occupancy sensors	Solar shading devices
Replace mercury vapor with high pressure sodium lamps	Family housing blown-in insulation
Efficient street lighting	6.5 inches of additional ceiling insulation
Constant level lighting	
Electrical	**Water**
Small ventilation motor retrofit	Water heater insulation blanket
Medium size ventilation motor retrofit	Showerhead flow restrictors
Large size ventilation motor retrofit	Faucet flow restrictors
Small ventilation motor retrofit with adjustable speed drive	Desuperheaters
Medium ventilation motor retrofit with adjustable speed drive	Hot water heat pump
Large ventilation motor retrofit with adjustable speed drive	Instantaneous hot water heaters
Heating/cooling	**Utilities**
Pulse combustion/modular boiler	Heating distribution repair
Single loop digital control panels	Manhole sump pump repair
Ventilation heat recovery	Cool storage
Programmable thermostats in family housing	Direct-fired gas fired chillers greater than 100 tons
Seal duct leaks	Energy management control system
High efficiency gas furnaces for family housing	
Gas engine driven heat pumps for family housing	**Renewables**
Nominal efficiency furnaces for family housing	Solar water heating for family housing
Flue dampers/electronic ignition	Wind energy
High (SEER) air conditioning units	Microclimate modifications
	Solar powered street lights
Miscellaneous	Solarwall
Refrigerator replacements for family housing	Solar water heating for barracks

Figure 3–2. REEP ECO

b. Estimate ECO Energy, Demand, and Cost Savings by Building Category. The engineering data developed by CERL was provided in EXCEL spreadsheets to facilitate input into RIM. An example of this type of spreadsheet format is shown in Table 3-1. Key data used from these spreadsheets for the model include: the ECO's energy, demand, and cost savings; the ECO's impact on pollutant emissions; the initial and recurring costs associated with the ECO; and the number of years for an ECO payback. Note that the types of buildings in which the ECO would apply are specified at the bottom of the spreadsheet (see line 70 in Table 3-1). That is, each ECO was specified not only in terms of technology and site, but the applicable type(s) of building categories as well. As a result, a total of 6,936,218 items, 68,774,907 square feet, and 127,056 ton-hours of ECO were identified by particular end use. Other factors that were considered in the evaluation of the ECO included technical performance, climate, utility rates, and primary fuel source. The approach used to develop the ECO data can address changes in a variety of conditions, such as increases in fuel prices and personnel realignments caused by BRAC. The versatility of this approach is founded on the categorization of ECO by functional end use, and more specifically, the 10 building categories listed in Figure 2–2. This enabled many of the performance and operational aspects of ECO to be quickly modeled among similar building types at different sites.

Table 3-1. Example Engineering Data Spreadsheet (page 1 of 3 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	2 x 4 Fluorescent Lighting Retrofit																							
2																								
3				Energy Savings			Fuel Savings					Dollar Savings								Pollution Abatement				
4		Number	Initial	Heating	Cooling	Total Energy	Elec	Demand	Gas	Oil	Coal	Elec	Demand	Gas	Oil	Coal	HVAC	HVAC	Total	SOx	NOx	Particulates	CO	CO2
5		of	Cost	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Savings	Energy	Demand	Annual	Abated	Abated	Abated	Abated	Abated
6		Fixtures		MBTU/Yr	MBTU/Yr	MBTU/Yr	MBtu/Yr	kW	MBtu/Yr	MBtu/Yr	MBtu/Yr	$/Yr	$/Yr	$/Yr	$/Yr	$/Yr	Savings $/Yr	Savings $/Yr	Savings $	Tons	Tons	Tons	Tons	Tons
7	FORSCOM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	FT BRAGG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	FT CAMPBELL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	FT CARSON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	FT DEVENS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	FT DRUM	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	FT HOOD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	FT SAM HOUSTON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	FT IRWIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	FT LEWIS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	FT McCOY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	FT McPHERSON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	FT MEADE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	FT ORD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	FT POLK	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	FT RILEY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	PRESIDIO OF SF	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	FT STEWART	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	TRADOC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	FT BLISS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	FT DIX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	FT EUSTIS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	FT GORDON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	FT HUACHUCA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	FT JACKSON	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	FT KNOX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	FT LEAVENWORTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	FT LEE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	FT RUCKER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37	FT SILL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	FT LEONARD WD	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	AMC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	ANNISTON ARMY	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41	CORPUS CHRISTI	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	PINE BLUFF ARS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43	PUEBLO DPT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44	RED RIVER DPT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	ROCK ISLAND ARSNL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46	TOOELE ARMY DPT	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	WATERVLIET ARSNL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49	HOLSTON AAP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	LAKE CITY AAP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
51	RADFORD AAP	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
53	DETROIT ARSNL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
54	FT MONMOUTH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
55	REDSTONE ARSNL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
57	ABERDEEN PRVG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
58	PICATINNY ARSNL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
59	WHITE SANDS MR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61	FT DETRICK	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
62	WALTER REED AMC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
63	MDW	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
64	FT BELVOIR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65																								
66	TOTALS	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
67																								
68																								
69	Facility Assumptions							ECO Attributes									Filtered Results - Paybacks less than 10 years							
70	Applied to Training, Hospital & Medical, Admin., & Community type facilities							Existing fixture wattage			196	watts					Number of Installations		67					
71	Square feet per fixture				60	SF		Retrofit fixture wattage			88	watts					Number of Opportunities		1 353 275					
72	% of floor area affected				70	Percent		Installed cost per fixture			$136 14	Dollars					Installed Cost (incl SIOH + Design costs)		$203 211 171					
73	Annual hours of operation (12 hrs/day*5 days/wk*52 wks/yr)				3120	Hours		Recurring costs (% of IC)			-1 5	Percent					Dollar Savings / Yr (energy + non-energy)		$58 317 306					
74	HVAC Cooling energy credit				15	Percent		Economic life			15	Years					Average Simple Payback Period - Years		3 5					
75	HVAC Cooling demand savings				25	Percent											Savings to Investment Ratio		3 3					
76																	Adjusted Internal Rate of Return		12 24%					
77																	Total Energy Savings - MBtu/Yr		616 428					
78	Plant efficiencies																							
79	Gas			70	Percent																			
80	Oil			65	Percent																			
81	Coal			60	Percent																			
82	Summer interior design temp			78	F																			
83	Winter interior design temp			68	F																			

Table 3-1. Example Engineering Data Spreadsheet (page 2 of 3 pages)

	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW
1		ECIP Evaluation			2 x 4 Fluorescent Lighting Retrofit																				
2																									
3																								Table A	
4	Hydrocarbons	Const	SIOH	Design	Total	Salvage	Utility	Utility	Total	Discount	Annual	Elec	Elec	Annual	Gas	Gas	Annual	Oil	Oil	Annual	Coal	Coal	Annual	Demand	Demand
5	Abated	Cost		Cost	Cost	Value	Rebate	Rebate	Investment	Factor	Elec	Discount	Discounted	Gas	Discount	Discounted	Oil	Discount	Discounted	Coal	Discount	Discounted	Demand	Discount	Discounted
6	Tons	$	6%	6%	$	$	%	$	$	Table	Savings $	Factor	Savings $	Savings $	Factor	Savings $	Savings $	Factor	Savings $	Savings $	Factor	Savings $	Savings $	Factor	Savings $
7																									
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
22	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
23	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
24	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
26	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
27	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
28	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
29	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
30	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
31	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
32	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
33	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
35	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
36	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
37	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
38	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
39	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
40	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
41	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
42	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
43	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
44	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
45	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
46	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
47	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
48	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
49	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
51	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
52	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
53	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
54	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
55	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
56	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
57	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
58	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
59	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
60	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
61	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
62	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
63	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
64	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
65	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
66	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]		[illegible]	[illegible]		[illegible]	[illegible]		[illegible]	[illegible]			[illegible]		[illegible]

Table 3-1. Example Engineering Data Spreadsheet
(page 3 of 3 pages)

	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW
1									Ten Year Filter																	
2		Non-energy savings or cost													Filtered Energy Savings						Filtered Pollution Abatement					
3		Annual								10	BG + 3A															
4-6	Total Discounted Savings $	Recurring Savings or Cost $	Table A Discount Factor	Date'10 Savings Or Cost $	Simple Payback Years	Total Net Discounted Savings	SIR Ratio	Adjusted Internal Rate of Return	Payback Logic Test	Total Investment $	Annual Savings $/Yr	Sorted Units	SIR Ratio	Adjusted Internal Rate of Return	Total Energy Savings MBtu/Yr	Elec Savings MBtu/Yr	Demand Savings kW	Gas Savings MBtu/Yr	Oil Savings MBtu/Yr	Coal Savings MBtu/Yr	SOx Abated Tons	NOx Abated Tons	Particulate Abated Tons	CO Abated Tons	CO2 Abated Tons	Hydrocarbons Abated Tons
7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
12	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
19	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
21	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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c. Estimate ECO Market Captured to Date. A required data input to RIM is the remaining ECO economic potential. While the installation of some REEP ECO would be for the first time, others have been previously installed on a limited scale. To more accurately estimate the remaining economic potential of REEP ECO, an accounting of prior ECO investment was necessary.

(1) An accounting of prior ECO investment was accomplished through a survey questionnaire completed by individuals from the Army energy community. Surveys were distributed on two separate occasions, the first being at the US Army Corps of Engineers National Energy Team (CENET) meeting in November, 1992. Respondents were given a list of REEP ECO and asked to estimate the percent of the economic potential already captured for each ECO. Survey takers were told to consider domestic Army facilities only, and provide a low and high estimate for each ECO. High and low estimates were requested so a response range could be established. The REEP study team collated the survey results and produced a median high and low statistic for each ECO. The study team decided to use the median because of some outliers in the survey results. Using the mode would have been inappropriate due to some response distributions that were bimodal.

(2) Results from the first survey were incorporated into the second. The second survey was distributed at the CENET meeting held in April 1993. This second survey was identical to the first, in that it requested low and high estimates of ECO economic potential already captured for the REEP ECO. The second survey differed from the first in that it listed the low and high median statistics that resulted from the first survey. Survey takers were instructed to examine the results from the first survey on a ECO by ECO basis. If they agreed with the results for a given ECO, then no alterations would be made to the survey form. If respondents disagreed with the outcome of the first survey for a given ECO, then they were to edit the initial results accordingly.

(3) The results of the survey were collated by the REEP study team, and median low and high statistics were calculated on a ECO basis. To serve as the estimator for captured ECO economic potential, the REEP study team decided to use the high median statistics. This was done to produce conservative estimates, that is estimates on the high end of ECO economic potential already captured. The data variable that is ultimately fed into RIM is the remaining economic potential of an ECO. This is calculated by subtracting the captured ECO economic potential (in percent) from 100. By using the high median estimate, the remaining economic potential will be lower (as opposed to using the low median estimate). Thus, RIM will produce energy, cost, demand, and pollutant reduction savings estimates on the low end, establishing a lower bound for potential savings.

(4) Survey results are presented in Table 3-2. The REEP ECO are grouped into category types. To the right of each ECO is the estimated remaining economic potential, in percent. The degree of remaining economic potential varied considerably depending upon the ECO. For example, the ECO with the lowest estimated remaining potential was additional ceiling insulation, at 27.5 percent. Direct-fired gas fired chillers (greater than 100 tons) was the ECO with the highest estimated remaining potential, at a full 100 percent. It should be noted that there were six ECO that had no survey estimates. This occurred because these ECO were introduced into the REEP ECO study set after the surveys were completed. For these six ECO, a default value of 70 percent was substituted for remaining economic potential. The default values are denoted with an asterisk in Table 3-2.

Table 3–2. REEP ECO Survey Results

ECO	Remaining economic potential (%)	ECO	Remaining economic potential (%)
Lighting		**Water**	
2x4 Fluorescent lighting retrofit	85	Water heater insulation blanket	47.5
Compact fluorescent retrofit	85	Showerhead flow restrictors	55
Exit lighting retrofit	82.5	Faucet flow restrictors	55
Occupancy sensors	95	Desuperheaters	98
Replace mercury vapor with high pressure sodium lamps	67.5	Hot water heat pump	70[a]
Efficient street lighting	77.5	Instantaneous hot water heaters	70[a]
Constant level lighting	70[a]		
Electrical		**Miscellaneous**	
High efficiency ventilation motors (small, medium, and large)	80	Refrigerator replacements for family housing	85
Variable speed drives (small, medium, and large)	85		
Heating and cooling		**Renewables**	
Pulse combustion/modular boiler	85	Wind energy	70[a]
Single loop digital control panels	85	Microclimate modifications	94
Ventilation heat recovery	90	Solar powered street lights	98
Programmable thermostats for family housing	77.5	Solar water heating for family housing	90
Seal duct leaks	72.5	Solar water heating for barracks	90
High efficiency gas furnaces for family housing	85	Solarwall	98.5
Gas engine driven heat pump for family housing	65		
Nominal efficiency furnaces for family housing	65		
Flue dampers/electronic ignition	75		
High SEER air conditioning units	65		
Envelope		**Utilities**	
Radiant barriers	70[a]	Heating distribution repair	50
High reflectance roof surface	90	Manhole sump pump repair	50
Window films	82.5	EMCS	65
Solar shading devices	70[a]	Cool storage	90
Family housing blown-in insulation	45	Direct-fired gas fired chillers greater than 100 tons	100
6.5 inches of additional ceiling insulation	27.5		

[a]Denotes no survey estimate was available, so default value of 70 percent was utilized.

(5) Table 3-2 verifies that all of the REEP ECO are commercially available. This is shown by the remaining economic potential percentages, where all ECO except direct-fired gas fired chillers have had some prior investment and installation. This notion of partial ECO penetration runs counter to the prevailing belief in some segments of the Army community. Some believe that most ECO opportunities throughout the Army have already been thoroughly exploited. Table 3-2 shows that based on survey estimates, the majority of ECO have remaining economic potential percentages in the 70-98 percent range.

(6) The category type ranking highest with respect to remaining economic potential were the renewable ECO. All renewable ECO, except for wind energy, had remaining economic potential estimates in the 90 percent or greater range. It can be speculated that wind energy would also have had a high estimate, but it was one of the ECO not included in the survey. Closer scrutiny of survey taker responses shows that the variation of estimates for renewable ECO was very tight. The difference between the lowest and highest remaining economic potential estimate for all renewable ECO did not exceed 10 percentage points. This implies a high level of confidence in the renewable ECO estimates, since the responses of the Army energy experts tended to converge.

(7) Three ECO had exceptionally low variation in their penetration estimates. They were desuperheaters (water ECO), microclimate modifications (renewable ECO), and occupancy sensors (lighting ECO). The difference between the lowest and highest remaining economic potential estimate for any of these three were less than or equal to 4 percentage points. This suggests a high degree of convergence amongst the survey takers.

(8) Four of the ECO had extremely high variation in their penetration estimates. They were flue dampers/electronic ignition (heating and cooling ECO), heating distribution repair (utility ECO), nominal efficiency furnaces for family housing (heating and cooling ECO), and programmable thermostats for family housing (heating and cooling ECO). The difference between the lowest and highest penetration estimate was 90 percentage points or higher. This suggests no convergence among the survey takers for these ECO.

3-3. IDENTIFY AND DESCRIBE SOURCES OF FINANCE (TASK 2). This task identified and described Department of Defense (DOD) programs and types of non-DOD institutions that could finance ECO investment in the Army. Each of these funding sources is described further in Appendix F. An example of a description of a funding source, Energy Conservation Investment Program (ECIP), is depicted in Figure 3-3. These descriptions were based upon information obtained during the course of this study. However, the terms and conditions of these funding sources may change in the future.

a. As indicated in Chapter 2, one of the principal objectives of this task was to estimate the annual budgets (by either program or appropriation) that would be available for ECO acquisition. Since this information was not available during the study, total annual budgets for all the ECO were developed based on policy established in EPACT and its 10 year payback 2005 procurement requirement. The method used to estimate the annual budgets required to meet this requirement for the ECO identified at the 49 sites was annualized between FY 1994 and FY 2005. Thus, the budgets calculated using this approach increased during the study period as more ECO were identified. The results of these calculations are addressed in Paragraph 3-5.

Description	Conditions
Military construction funded program used to improve the energy efficiency of existing Defense Department facilities while reducing the associated utility energy and nonenergy related costs. Reduces energy use through construction of new, high efficiency energy systems, buildings or facilities for which a defense component pays for the facilities energy. - Energy monitoring and control systems/ heating, ventilation, air conditioning (HVAC) controls - Steam/condensate systems - Boiler plan modifications - HVAC - Weatherization - Lighting systems - Energy recovery system - Electrical energy systems - Renewable energy systems - Facility energy improvements	- Projects greater than or equal to $300,000 - Savings to investment ratio greater than 1.25 - Payback less than 10 years - Military Construction, Army, dollars - Energy retrofit projects only

Figure 3-3. Energy Conservation Investment Program (ECIP)

b. Two sources of funds outside the government that could help support investment in Army ECO are demand side management (DSM) programs and energy savings performance contracts. Utility DSM programs offer a range of incentives (including cash rebates) for customers to invest in energy efficiency and conservation measures. Energy savings performance contracts are arrangements between the government and a contractor whereby the contractor provides resources for implementing energy cost savings measures and in turn receives a portion of the actual energy cost savings that accrue to the government. The Energy Efficiency Resource Directory: A Guide to Utility Programs provides a review of DSM programs offered by utilities in the US. Information about ECO rebates (one of the principal DSM methods) in this report were of particular interest since they can be quantified and thus can be considered in the development and evaluation of ECO investment strategies. For example, if a utility is offering energy efficient lighting rebates, then customers who purchase these items receive a check or a credit on their utility bill for an amount prescribed by the program. Utilities offering ECO rebates in service areas that included the 49 US Army sites were contacted to collect information and gain insights about their rebate programs. ECO rebates from utilities are clearly a promising source of financial support and should be used whenever possible. The scope and characteristics of utility rebate programs (available as of when the utilities were contacted) that could financially benefit ECO investment in the Army are presented in Appendix F. The data provided on these programs are subject to change at the discretion of the utility.

c. EPACT encourages Federal agencies to use energy savings performance contracts (formerly referred to as shared energy savings) as a source of ECO finance. Several Army installations involved with shared energy savings contracts were identified and asked about their experiences. This research produced considerable information regarding the positive aspects of using shared energy saving to finance ECO investment. However, many more problems were raised. The key strengths and weaknesses of shared energy savings for ECO investment that were identified by the installations are discussed in Appendix F. For

example, the most common problem identified was that it took too long (up to 2 years) to negotiate and implement shared energy savings contracts. These types of obstacles are apparently common across most Federal agencies, and as a result, the Department of Energy (DOE) is standardizing and streamlining the process of facilitating energy performance contracting in the Federal government. Although there is significant potential for using energy savings performance contracts in the Army, many of the obstacles raised by the installations need to be overcome.

3-4. BUILD AND TEST THE REEP INVESTMENT MODEL (RIM) (TASK 3)

a. This task involved designing, building, and testing a multiobjective linear programming model--RIM. The model maximizes cost, energy, and load savings and pollutant reduction for individual or combinations of renewable and conservation investments, while explicitly considering budget constraints, energy and environmental goals, and economies of scale.

b. RIM develops and analyzes optimal renewable energy and energy efficiency investment strategies at US Army facilities on an annual basis (i.e., what to buy, how many, where, and when). RIM incorporates a multiobjective linear programming approach in order to quickly assimilate, analyze, and summarize the large volume of data needed for evaluating a range of energy efficiency measures among many geographically and institutionally disparate Army sites and facilities. The RIM mathematical programming approach used to evaluate the impacts of a large number of decision variables was ideally suited for producing the detailed results needed to formulate investment strategies. RIM was structured to determine the optimum ECO and site-specific investment strategy for maximizing any one or combination of the four possible alternative objective functions listed in Figure 3-4.

Model objective functions:	• Maximize energy savings • Maximize demand savings • Maximize cost savings • Maximize pollutant reductions

Figure 3-4. RIM Objective Functions

c. The four objective functions defined for application in RIM expressed key energy and environmental goals established by Army policy. RIM is capable of applying objective functions singularly or in combinations during processing. Depending upon policy and decisionmaking needs, a single or weighted grouping of objective functions is applied to govern development of investment strategies for maximizing the designated objective functions. While optimizing the selected objective functions, RIM calculates the impacts for each of the four objective functions (those selected for optimization and those not selected). RIM output specified the ECO/site-specific economic and environmental impacts of implementing ECO measures and the total impacts for implementing all measures across all sites. The results of the two applications presented in this chapter are based solely on maximize cost savings runs.

d. When two or more objectives are considered in a study, they can be applied sequentially or weighted in a multiple objective function.

(1) Applying two objectives sequentially involves two optimization runs. In the first run, the objective chosen as primary is optimized. Then a constraint is added to the model that maintains the primary objective value achieved in the first run. The secondary objective

is optimized in a run which must satisfy this constraint. In the case of more than two objectives this process can be continued where each run must maintain the objective values achieved in the previous runs.

(2) Using a multiple objective function involves just one optimization run regardless of the number of component objectives involved. Each component objective is multiplied by a constant (weighted), then the sum is formed of the modified components to obtain the multiple objective function. This sum being a linear combination of linear objectives is, of course, itself linear.

(3) In general, it is not a routine process to determine whether and how to use sequential or weighted objectives. The resolution of these issues depends on context and on perceptions of the problems. It may involve substantial discussions between decisionmakers and analysts.

(4) The REESIN QRA Report discusses optimizations where both the cost savings and the pollutant reduction objectives were applied in a multiple objective function. The component objective functions used--Maximize Cost Savings and Maximize Pollutant Reduction--were weighted equally. More specifically, in the optimization process saving $1,000 is considered (for analysis purposes) as important as emitting one less short ton (STON) of pollutant. Single objective cost savings and single objective pollutant reduction runs were also conducted. The results of the three runs were consistent, in that cost savings, for example, were smallest in the maximize pollutant reduction case, increased some in the multiple objective optimization, and were largest in the run where the single objective was to maximize cost savings. The cost savings values of the two extreme cases (the single objective runs) gave sensitivity information on the influence of weights on cost savings results.

e. RIM imposed budgetary constraints and the quantity or amount of ECO remaining for potential investment (expressed as equations) during processing. The investment budget constraint limited the total number of dollars which could be used to acquire ECO. The second constraint limited the model's implementation of ECO measures to the total number of opportunities remaining at any point during the model run. Within these defined parameters, the model was free to calculate and develop the ECO site implementation sequencing plan which maximized the selected objective function(s).

f. Standard Data Inputs for Developing REEP Investment Strategy. Figure 3-5 identifies the standard set of selected ECO data which were derived and input into RIM to produce investment strategies under alternative study scenarios. Model logic fields were designated (expressed as equations) to reflect the objective functions to be applied during the model run. Assumed budget constraints were entered, as appropriate.

DATA	- Initial cost of a 1% investment in ECO - Annual energy savings resulting from a 1% investment in an ECO - Annual demand savings resulting from a 1% investment in an ECO - Annual cost savings of a 1% investment in an ECO - Annual environmental savings resulting from a 1% investment in an ECO - Percentage of economic potential remaining - Budget constraint (enter fiscal budget amounts)
LOGIC (EQUATIONS)	- Objective functions (select from four options)

Figure 3-5. Standard Data Inputs Used by the Model in Developing REEP Investment Strategies

g. Standard Data Outputs Identifying Investment Strategy. Figure 3–6 identifies the standard set of data which were calculated and produced by the model for each ECO and site included in the run. Collectively, these data outputs comprise a comprehensive and detailed strategy for investing in all ECO (specified for appropriate building categories) at all sites in the precise order which maximized the selected objective function(s). A sample illustration of model output is included at Appendix E.

- Percent investment by ECO and site
- Percent cumulative investment start by ECO and site
- Annual implementation costs by ECO and site
- Annual energy savings by ECO and site
- Annual demand savings by ECO and site
- Annual cost savings by ECO and site
- Annual environmental savings by ECO and site

Figure 3–6. Standard Data Output from RIM

3–5. DEVELOP AND EVALUATE INVESTMENT STRATEGY (TASK 4)

a. General

(1) This task involved completing and testing the REEP analytical methodology and applying this to produce Army energy investment strategies for selected objective functions, energy and environmental policies/goals, and budget constraints. REEP investment strategies were formulated to present detailed site and ECO–specific acquisition plans (i.e., what to buy, how many, where, and when) and the macro, as well as the detailed, economic and environmental impacts of implementing ECO. In accomplishing this task, detailed site-specific ECO data and representative energy program scenarios (derived from energy policy and sponsor study requirements) were used in conducting RIM runs to produce energy investment strategies. Model outputs were downloaded to a Microsoft EXCEL spreadsheet program and the results summarized to illustrate generated investment strategies.

(2) The REEP methodology was applied to various stages of the development and testing process in order to produce successively more comprehensive investment strategies, evaluate and enhance the operation of RIM, and refine the methodology. During the course of the study, two principal applications of REEP were requested by the study sponsors. The analysis and results of these two issues are presented in this paragraph. The two issues raised were:

(a) What should the investment strategy be for a sample of 16 ECO (with paybacks of 10 years or less) at US Army facilities in CONUS that maximizes cost savings and can be implemented completely by FY 2005?

(b) What should the investment strategy be for 47 ECO (with paybacks of 10 years or less) specified at US Army facilities in CONUS that maximizes cost savings and can be implemented completely by FY 2005? The last issue served as a "base case," since it considered the total number of economically feasible ECO identified in the REEP Study and is in accordance with EPACT and Army energy policy.

(3) The REEP methodology was also applied in the REESIN QRA which was performed for the Assistant Secretary of the Army for Installations, Logistics, and Environment (ASAILE). In support of the National Performance Review (NPR), the REESIN QRA identified energy conservation opportunities and strategy for their investment that maximize cost savings and pollutant reduction at US Army facilities. The REESIN QRA is documented in a separate report.

(4) Developing an ECO investment strategy that meets the EPACT mandated goal of decreasing energy usage per square foot by 20 percent between 1985 and 2000 was not requested as an application of the REEP methodology. This was due to: (1) the Army being already close to meeting this requirement; and (2) preliminary runs showed that the 10-year payback requirement significantly dominated the energy efficiency improvement requirement of 20 percent. Therefore, RIM applications that were requested by the study sponsors focused on the EPACT 10-year payback requirement.

b. Demonstration of the REEP Methodology in Support of the DOD/DOE EPACT Review. A demonstration of the REEP methodology was prepared and presented in support of the DOD/DOE EPACT review conducted in April 1993. The purpose of this demonstration was to illustrate the capability of the emerging REEP methodology to respond to the analytical, planning, and decisionmaking requirements posed by enactment of EPACT. With development still ongoing, the methodology had progressed sufficiently to illustrate its utility for addressing EPACT requirements. Essential data processing features of RIM were operational, and a representative range of ECO data had been provided by CERL and prepared for evaluation by RIM.

(1) The basic approach used was to develop the example application of the methodology using 16 ECO, all 49 study sites (representing about 75 percent of energy consumption at Army facilities in CONUS), the EPACT provision requiring all ECO paybacks of 10 years or less to be implemented at Federal facilities by 2005, and the provision of EPACT to undertake ECO investments that maximize cost savings. (Note: the FY 2005 EPACT payback requirement was considered in all subsequent applications of the methodology.) Two variations of this approach, one assuming no rollover of cost savings and one assuming a 50 percent rollover of cost savings, were used. EPACT includes a provision for Federal agencies that one-half of the cost savings generated by an ECO should be "rolled over" or reinvested in additional ECO. The rollover variation assumed that one-half of the cost savings resulting from ECO implementation would be made available the year following the year in which the cost savings occur. ECO investments using cost savings from rollover funds were in addition to calculated annual investment budget amounts.

(2) The 16 ECO (Figure 3–7) considered in the example application were in four categories representing a variety of end uses and ECO operating characteristics. Each ECO had a 10-year payback or less at one or more of the 49 sites. The 49 sites presented a wide range of facility types, prevailing climatic conditions, and servicing utility companies. The 12-year time span (FY 1994–FY 2005) used to coincide with the EPACT requirement, illustrated RIM's capability to address large volumes of complex data over long program and planning horizons.

(3) The specific problem addressed in the example application was, "What should the investment strategy be for a sample of 16 specified ECO (with paybacks $\leq$ 10 years) at CONUS Army facilities that both maximizes cost savings and is implemented completely by FY 2005?" Key assumptions and parameters used for the example application were:

- Address 49 sites with annual utility bill > $5 million
- Army program/budget for ECO acquisition is $32.9 million annually for FY 94–FY 05
- No rollover of cost savings (a "what if" variation was conducted using one-half rollover of cost savings)
- Analysis considers only appropriated total obligational authority (TOA); no performance contracts or rebates/special rates
- No economies of scale
- Opportunities reported by CERL for implementing ECO were as adjusted by market penetration surveys

- Analysis does not address synergistic effects
- All dollars are expressed as FY 93 constant dollars

Category	ECO
Lighting	
	Install occupancy sensors
	Replace/relamp exit signs
	Replace incandescent lamps with compact fluorescent
	Install T8 lamps and electronic ballasts
Heating/Cooling	
	Thermal water storage for load management
	Install high efficiency gas furnaces in family housing
	Install modular boilers
	Install programmable thermostats in family housing
	Small ventilation motor retrofit
	Medium ventilation motor retrofit (10 – 20 HP)
	Large ventilation motor retrofit (>20 HP)
Envelop	
	Insulate FH walls with blown-in rockwool
	Install window solar film
	Insulate above tile ceilings with 6 inches insulation
	High reflectance roof membrane
Water	
	Insulate domestic hot water tanks

Figure 3–7. 16 ECO Considered in Example Application

(4) The investment cost (with no rollovers) of complying with the EPACT requirement for the 16 ECO at the 49 sites was annualized between FY 1994 and FY 2005, resulting in 12 equal annual budgets of $32.9M. Based upon these budgets, RIM was used to generate a detailed investment strategy for acquiring all ECO at all sites by 2005. The pattern of the ECO acquisition strategy generated by the model is graphically depicted in Figures 3–8a and 3-8b. Two graphs were needed to accommodate the difference in how individual ECO were measured (i.e., some ECO were measured as item quantities and others were measured in terms of square feet). The results shown in Figure 3-8b are categorized into 4 groups for graphical clarity purposes.

(5) Three key observations were made from these results. First, that ECO performance varies significantly from site to site. That is, once it has been determined that an ECO will pay back in 10 years or less, its performance at each individual site becomes one of the key factors for evaluation by RIM. ECO performance variations among the sites were, in most part, attributable to regional climatology, rates charged by servicing utilities, types of fuel used by servicing utilities to generate electricity, and types of buildings at the sites. The net result of these factors was that most ECO were shown to have wide-ranging cost savings performance across the various study sites. None of the ECO were shown to be the top cost savings performer for all sites.

(6) Secondly, only 2 of the 16 ECO (compact fluorescent lighting and insulating hot water tanks) showed superior cost savings performance across most sites and were almost fully acquired in the initial program years. Patterns for several other ECO show that they were acquired early at several sites, but delaye substantially at those sites where cost savings were comparatively at the lower end of e cost savings range.

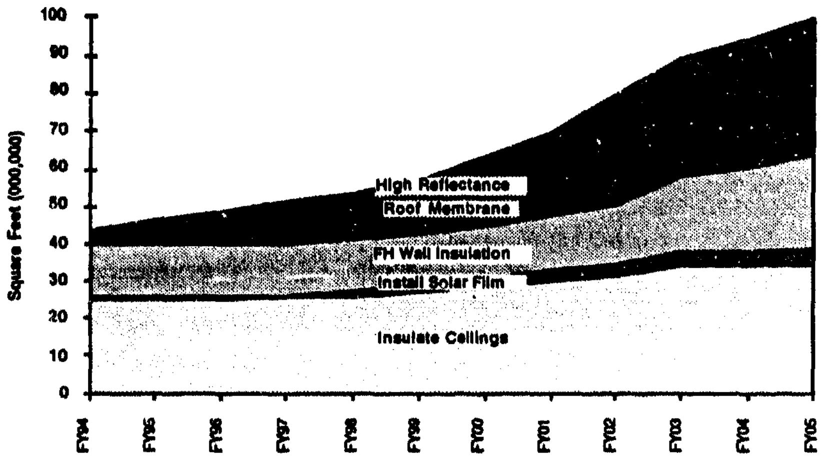

Figure 3–8a. Acquisition Pattern for 16 ECO—No Rollover

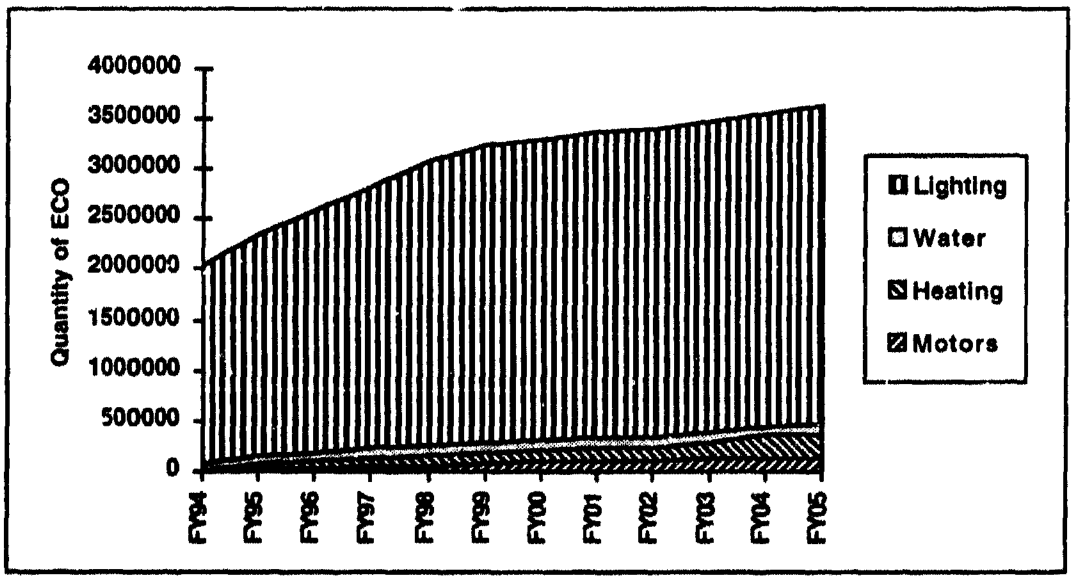

Figure 3–8b. Acquisition Pattern for 16 ECO (Expressed in 4 Categories)--No Rollover

(7) And lastly, the results showed that RIM considered the relative investment cost in comparison to the cost savings associated with an ECO. Of the site, ECO combinations available, RIM always acquired the ones with the greatest cost savings for invested dollar.

(8) Figure 3–9 summarizes selected model results for the example application. Results have been summarized to show the impacts of implementing the 16 ECO over the study period, FY 1994 through FY 2005, under an investment strategy which maximizes cost savings. A cost savings of $1.1 billion was generated over the study period from a total investment of $395 million. This was a return of $2.78 for each dollar invested over the study period. This cost savings impact would be $2.1 billion if measured over the useful life of ECO rather than limited to the study period. This represents a return of $5.31 for each invested dollar. RIM also determined the immediate impacts of ECO acquisition on energy and demand savings and pollutant reduction.

Investment costs: $395 million (FY 1993 dollars)	
All investment is made from calculated Army budgets	
Cost savings	$1.1 Billion
Energy savings	15.7 Million Mbtu
Demand savings	4.18 Million kilowatts
Pollutant reduction	7.82 Million short tons

Figure 3–9. Selected Output for 16 ECO With No Rollover (FY 1994–FY 2005)

(9) A variation of the analysis was conducted and presented to illustrate the flexibility of RIM to accommodate changes in policy and scenario assumptions and to highlight the impact of an ECO cost savings rollover policy. This variation assumed that, in addition to the annual investment budget amount of $32.9M, one–half of the cost savings generated by ECO implementation would be retained for investment in additional ECO. ECO acquisition strategies (with rollover effects) generated are graphically depicted in Figures 3–10a and 3-10b. A major impact of cost savings rollover was that, given annual budgets of $32.9 million, all ECO were acquired by FY 2000. That is, the EPACT requirement for 2005 was met 5 years earlier than mandated without increasing the budgets.

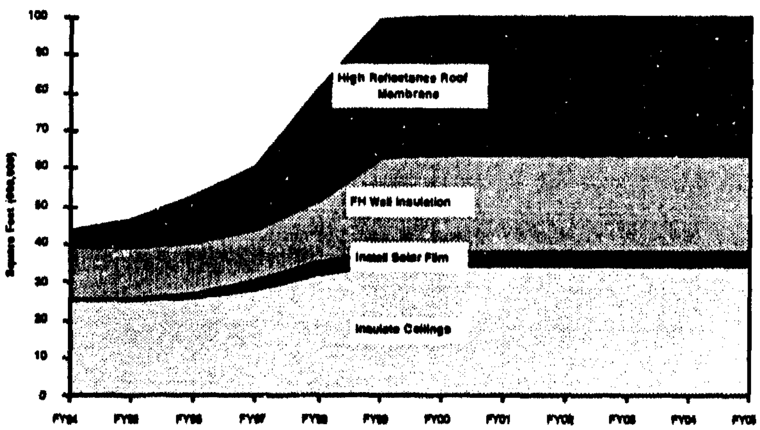

Figure 3–10a. Acquisition Pattern for 16 ECO—50 Percent Rollover (FY 94–FY 05)

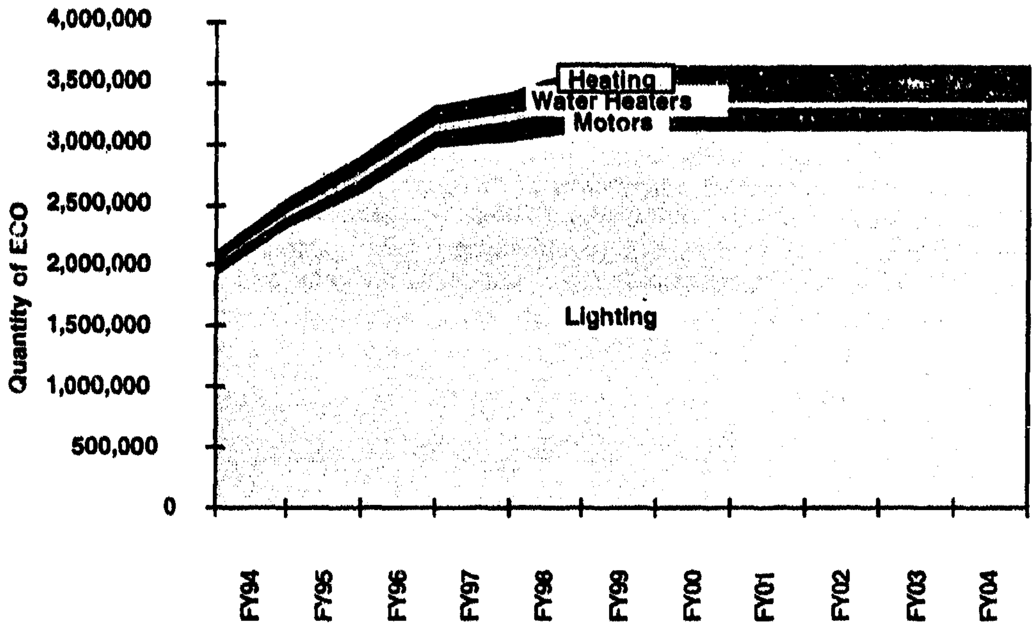

Figure 3–10b. Acquisition Pattern for 16 ECO (Expressed in 4 Categories)—50 Percent Rollover (FY 94–FY 05)

(10) Table 3–3 compares the overall results of the no rollover and rollover runs. Results have been summarized to show the impacts of implementing the 16 ECO over the study period, FY 1994 through FY 2005, under an investment strategy which maximizes cost savings. A cost savings of $1.27 billion was generated in the rollover case, or $170 million more than with no rollover. Since one–half of this amount, or $85 million, was used to augment the assumed investment budget, the model acquired more ECO earlier, resulting in greater overall cost savings. While the total ECO investment cost was $395 million in each case, only $172.3 million was provided from budgeted investment funds in the rollover case. The balance of the total acquisition cost, $222.7 million, was funded through rollover funds. Investing in the 16 ECO provided a return of $7.31 (over the study period) for each budget dollar invested and a return of $3.22 (over the study period) for each total dollar (budget and plus rollover) invested. As with the no rollover case, impacts of the rollover variation would be substantially higher if calculated over the useful life of ECO rather than limited to the study period. The $2.1 billion savings generated over the useful lives of the ECO equates to a return of $12.19 for each budgeted dollar invested and $5.32 for each total dollar invested.

Table 3-3. Comparative Results for 16 ECO-No Rollover versus 50 Percent Rollover (FY 94-FY 05)

	With 50% rollover	No rollover
Cost savings (FY 93 $)	$ 1,270,000,000	$ 1,100,000,000
Energy savings (Mbtu)	25,083,000	15,715,000
Demand savings (kW)	5,220,000	4,180,000
Pollutant reduction (STON)	9,310,000	7,820,000

c. Base Case Application of the REEP Methodology

(1) The investment strategy formulation portion of the REEP Sudy effort culminated in the development of a base case application of the methodology. This application addressed all ECO developed and evaluated by CERL for the study which had a payback 10 years or less at one or more of the study sites. The 47 ECO that met the payback criterion are identified in Figure 3-11. The key assumptions and parameters applied in the base case are listed in Figure 3-12. The same method used to calculate the annual budget requirements in the DOE/DOD EPACT application was applied here. The calculated annual investment budget was increased to $87.9 million to cover the cost of the additional 31 ECO. The Army policy requiring one-third of ECO cost savings to be rolled over into additional ECO (which had been recently reevaluated and affirmed by Headquarters, Department of the Army (HQDA)) was applied in the development of the investment strategy. The number of opportunities remaining to implement ECO were adjusted, as necessary, to reflect the results of the second market penetration survey. The results of the second survey are shown in Table 3-2. The base case applied the objective function of maximizing cost savings per EPACT guidance.

(2) The enormity and complexity of the base case problem to be solved in RIM is reflected by the characteristics of the optimization matrix as shown in Figure 3-13. The additional ECO had geometrically expanded the size and complexity of the investment strategy problem. This would also occur if additional sites or ECO were added to the analysis. In producing results for the base case, RIM demonstrated its capability as a powerful, flexible analytical support tool.

Lighting	Envelope
2x4 Fluorescent lighting retrofit	Radiant barriers
Compact fluorescent retrofit	High reflectance roof surface
Exit lighting retrofit	Window films
Occupancy sensors	Solar shading devices
Replace mercury vapor with high pressure sodium lamps	Family housing blown-in insulation
Efficient street lighting	6.5 inches of additional ceiling insulation
Constant level lighting	
Electrical	**Water**
Small ventilation motor retrofit	Water heater insulation blanket
Medium size ventilation motor retrofit	Showerhead flow restrictors
Large size ventilation motor retrofit	Faucet flow restrictors
Small ventilation motor retrofit with adjustable speed drive	Desuperheaters
Medium ventilation motor retrofit with adjustable speed drive	Hot water heat pump
Large ventilation motor retrofit with adjustable speed drive	Instantaneous hot water heaters
Heating/cooling	**Utilities**
Pulse combustion/modular boiler	Heating distribution repair
Single loop digital control panels	Manhole sump pump repair
Ventilation heat recovery	Cool storage
Programmable thermostats in family housing	Direct-fired gas fired chillers greater than 100 tons
Seal duct leaks	Energy management control system
High efficiency gas furnaces for family housing	
Gas engine driven heat pumps for family housing	**Renewables**
Nominal efficiency furnaces for family housing	Solar water heating for family housing
Flue dampers/electronic ignition	Wind energy
High SEER/air conditioning units	Microclimate modifications
	Solar powered street lights
Miscellaneous	Solarwall
Refrigerator replacements for family housing	Solar water heating for barracks

Figure 3-11. ECO Considered in Base Case Application

- Addresses 49 Army sites with annual utility bill greater than $5 million.
- Army program/budget input is $87.9 million annually for FY1994 – 2005.
- One-third of the cost savings are "rolled over" for additional ECO investment.
- Analysis considers only total obligation al authority; no performance contracts or rebates/special rates.
- Considers ECO at installations where there will be a payback less than or equal 10 years.
- No ECO economies of scale.
- Fuel prices increase at the same rate as inflation.
- Analysis does not address synergistic effects.

Figure 3–12. Key Assumptions and Parameters for Base Case Application

Optimization matrix
- 39,158 Constraints
- 71,558 Variables
  - 32,400 Decision variables
  - 39,158 Slack variables
- 206,402 Coefficients

Hardware/software
- RISC 6000
  - UNIX
  - IBM Optimization Subroutine Library (OSL)
- Macintosh llfx
  - Microsoft Excel

Figure 3–13. RIM Characteristics

(3) The overall investment strategy produced by the model for the base case showed that 4 of the 47 ECO (shower and faucet water flow restrictors, manhole sump repairs, and heating distribution repairs) had exceptional cost savings performance at all sites and were fully acquired by the model in the first year (FY 94). Six others showed markedly superior cost savings performance at most sites. Two of these (water heater blankets and seal duct leaks) were fully acquired by the second year, and four more (compact fluorescent lights, exit lights, programmable thermostats, and microclimate modifications) were 90 percent procured by the third year. The strategy generally delayed the acquisition of four ECO (high efficiency AC units for family housing, wind energy, solar water heating for barracks, and small variable speed drives) in favor of other ECO since the model determined that they were comparatively less attractive cost savers. The model produced a widely dispersed acquisition strategy for the remaining 33 ECO. This was attributable to the wide variation in ECO cost savings performance among the sites.

(4) Impacts of the base case investment strategy for the study period and the useful life of the ECO are summarized in Table 3–4. Applying annual investment budgets of $87.9 million and one–third cost savings rollover, all 47 ECO were fully acquired by FY 2001 at a total cost of $1.1 billion. Breakout of ECO investment funding sources used in the model was: $684 million from annual Army investment budgets; and $371 million from the one–third cost savings rollover policy.

Table 3–4. Base Case Strategy--Results for Study Period versus System Life

	Maximize cost savings case FY 1994 – 2005	Life cycle impacts
Investment cost		
Programmed	$ 683,867,000	$ 683,867,000
From rollover	$ 371,477,000	$ 371,477,000
Total	$ 1,055,344,000	$ 1,055,344,000
Cost savings	$ 2,361,772,000	$ 4,262,166,000
Pollutant Reduction (short tons)	22,230,343	40,925,531
Energy savings (Mbtu)	151,462,000	287,401,000
Demand savings (kW)	6,710,926	12,569,319

(5) The base case strategy produced a cost savings of $2.4 billion over the 12-year period of analysis and $4.3 billion over the useful lives of the ECO (which normally were between 15 and 20 years). For each budget dollar the model invested in ECO, results show a return of $3.45 over the study period and $6.23 over the life cycles of the ECO. For each total dollar invested, results show a $2.24 return over the study period and $4.04 over the useful lives of the ECO. When measured over the useful lives of the ECO, energy and electrical demand savings and pollution reduction are shown to be approximately double those same impacts over the study period. Maximum annual cost savings of $249 million are generated by FY 2002. Under current Army policies, the disposition of these annual savings would be as follows: one–third retained by the installations producing the savings for investment in quality of life resources (which could be additional ECO); one–third for investment in new ECO at the installations; and one–third to be returned to the US Treasury.

(6) One of the goals of EPACT is to reduce US oil imports (which has also been a long-standing goal of the Federal government as well). Based on data from CERL, approximately 19 percent of the annual energy savings produced by the ECO is attributable to reduced oil usage at Army facilities and servicing electric utilities (which use oil as a primary fuel source to produce electricity). Applying this percentage to the annual energy savings of 16,823,804 Mbtu generated from the 47 ECO at the 49 CONUS sites saves 3,196,523 Mbtu from decreased oil consumption. According to CERL, one barrel of oil can produce about 6.347369 Mbtu. Thus, 503,598 barrels of oil (3,196,523 Mbtu / 6.347369 Mbtu per barrel) would be saved annually if the 47 ECO were implemented at the 49 CONUS sites. Currently about 42 percent of oil products supplied in the US is imported. Therefore as a result of implementing the ECO specified, about 211,511 fewer barrels of oil would need to be imported annually in the US.

3-6. SUMMARY. The utility and flexibility of using the REEP methodology for analyzing energy policy and programmatic issues can be characterized by its ability to incorporate changes and improvements in energy/environmental goals, engineering and cost data, analytical tools and scenarios. The study identified 47 economically feasible ECO (all of which are commercially available) at 49 major energy consuming Army sites in CONUS. Economically feasible ECO were characterized by having a payback of 10 years or less. Two surveys conducted during the study indicated that between 70-98 percent of the economic potential for most of these ECOs remains at Army facilities in CONUS. The REEP Investment Model (RIM)-a multiobjective linear investment programming model developed and evaluated optimal renewable energy and energy efficiency strategies at the designated Army CONUS sites on a yearly basis for selected objective functions, budget constraints and energy/environmental policies and goals. Defense and nondefense funding programs were identified and discussed as part of the REEP analysis for ECO acquisition. The two

applications of the REEP methodology show that substantial economic, energy, and environmental benefits would result from analytically based strategies for investment in ECO at US Army facilities. To maintain the integrity of REEP analyses, all data, data bases and models used must be updated and maintained on a regular basis.

APPENDIX A

STUDY CONTRIBUTORS

1. STUDY TEAM

a. Study Director

Mr. Steven B. Siegel, Force Systems Directorate

b. Team Members

COL John B. Harrington
LTC Andrew Loerch
Dr. Robert J. Schwabauer
Ms. Vas I. Mantzouranis
Mr. Mark T. Clements
Mr. Duane E. Gory
Ms. Dana G. Unkle

c. External Team Members

Mr. Donald F. Fournier, Jr., CERL
Mr. Robert J. Nemeth, CERL
Mr. Lee A. Edgar, CERL
Mr. John J. Krajewski, EHSC
Mr. Rodger Cundiff, EHSC

d. Other Contributors

LTC Rodger Pudwill
Mr. Diego Roque
LTC Michael Burchett
LTC James Goodenkauf
CPT William Mann
Ms. Nancy M. Lawrence
Ms. Tina H. Davis

2. PRODUCT REVIEW BOARD

Mr. Ronald J. Iekel, Chairman
MAJ Kern Wilson
Mr. Raymond McDowall

3. EXTERNAL CONTRIBUTORS

Mr. Gary Schanche, CERL
Mr. David Joncich, CERL
MAJ Lawrence Haller, LEA
MAJ Susan McDonald, LEA
Mr. Grant Keath, LEA
Ms. Fern Gaffey, LEA
Mr. Robert Starling, Corps of Engineers, Huntsville Division

Mr. Plyler McManus, Corps of Engineers, Huntsville Division
Mr. Arkie Fanning, Corps of Engineers, Huntsville Division
Ms. Linda Murray, Corps of Engineers, Huntsville Division
Mr. William Christner, EHSC
Mr. Satish Sharma, EHSC
Mr. Bernie Wasserman, EHSC
Mr. Lou Keller, EHSC
Mr. James Donnelly, EHSC
Mr. Hank Gignilliat, EHSC
Mr. Harry Goradia, EHSC
Mr. William Stein, The Army Energy Office
Mr. James Woods, GSA
Mr. James Wolfe, The Alliance to Save Energy
Mr. Mark Hopkins, The Alliance to Save Energy
Mr. Douglas Dahle, DON

APPENDIX B

STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20310-2600

REPLY TO
ATTENTION OF:

01 JUN 1992

CEHSC-FU-M

MEMORANDUM FOR Director, U.S. Army Concepts Analysis Agency, ATTN: CSCA-FSR, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797

SUBJECT: Renewables and Energy Efficiency Planning (REEP) - Study Directive

1. PURPOSE OF STUDY DIRECTIVE. This directive tasks the U.S. Army Concepts Analysis Agency (CAA) to develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy in Army facilities.

2. STUDY TITLE. Renewable and Energy Efficiency Planning (REEP).

3. BACKGROUND. The Army requires a quick turnaround decision support capability that can evaluate renewable energy and energy efficiency investment issues. The requirement for this capability is based upon the increasingly complex nature of analyzing the potential for renewable energy and energy efficiency in the Army when considering factors, such as energy system costs and performance, policy requirements, alternative sources of funding, budget constraints, the industrial base, environmental considerations and institutional characteristics. An analytical methodology that can logically incorporate these factors in support of the energy investment decision making process in the Army will be developed and applied in the study.

4. STUDY SPONSOR. The Assistant Chief of Engineers, Department of the Army, and the Associate Chief of Engineers for Strategic Initiatives, U.S. Army Corps of Engineers, are the study sponsors. Mr. John Krajewski, U.S. Army Engineering and Housing Support Center (EHSC) will serve as the sponsor's representative.

5. TERMS OF REFERENCE.

a. Purpose. The purpose of the study is to develop and apply an analytical methodology for evaluating the economic potential for investment in energy efficiency and renewable energy in Army facilities.

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SUBJECT: Renewables and Energy Efficiency Planning (REEP) - Study Directive

b. Scope.

(1) Timeframe of analysis: FY 1993-2010.

(2) Analysis will be conducted in two phases. Phase I focuses on FY 1993-1999 and Phase II covers FY 1993-2010.

(3) Army facilities in the U.S. only.

(4) Consider renewable energy and energy efficiency technologies and activities that are in research, development, demonstration, and commercialization phases of their life cycle.

(5) Public and private financial sources.

c. The objectives are:

(1) Estimate the energy and cost savings that could result from economic investment in energy efficiency and renewable energy in Army facilities.

(2) Estimate the costs associated with the economic investment in renewable energy and efficiency in Army facilities.

(3) Identify potential sources of funding for energy efficiency and renewable energy investment in Army facilities.

(4) Develop and evaluate investment strategy alternatives for undertaking economic investment in Army facilities.

6. RESPONSIBILITIES.

a. The study sponsors will:

(1) Provide a study point of contact (POC).

(2) Assist in providing CAA with available data and points of contact as required.

(3) Prepare an analysis of study results IAW AR 5-5, Army Studies and Analyses.

(4) Establish a Study Advisory Group (SAG). Schedule in-process reviews as required.

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b. The study agency, CAA, will:

(1) Designate a study director and establish a full-time study team.

(2) Establish direct communications with HQDA and other organizations required for the conduct of the study.

(3) Provide in-process reviews as requested and a final study report to the study sponsors.

7. ADMINISTRATION.

a. CAA will provide all administrative support necessary for the conduct of the study.

b. Funds required for TDY will be provided by the study sponsors. (Approximately $10,000)

c. Milestone Schedule:

Approval of Study Directive	1 May 92
In-process Reviews	Each 2-3 Months
Present Study Results	
Phase I	26 Feb 93
Phase II	30 Apr 93
Publish Final Report	1 Jul 93

d. EHSC in coordination with CAA, will prepare the initial DD Form 1498, Research and Technology Work Unit Summary.

e. CAA will submit the final, approved study report to Defense Technical Information Center (DTIC).

f. CAA will provide study results to the study sponsors as a study report.

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g. This tasking directive has been coordinated with CAA IAW paragraph 4, AR 10-38, United States Army Concepts Analysis Agency.

FOR THE CHIEF OF ENGINEERS:

JOHN F. SOBKE
Major General, USA
Assistant Chief of Engineers

WILLIAM L. ROBERTSON
Associate Chief of Engineers
Strategic Initiatives

APPENDIX C

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APPENDIX D

MATHEMATICAL DESCRIPTION OF THE REEP INVESTMENT MODEL

D-1. INTRODUCTION. This appendix presents a formal technical description of the core methodology of the REEP Investment Model (RIM). In addition, it contains the equations for the recently implemented prototype methodology involving economies of scale. A sequential use of the objective functions and an example of optional additional constraints are also given. The postprocessing equations, which are found on the spreadsheets, are not presented here as they are never seen by the optimizer. (Many of the postprocessing equations convert percentage results into quantity values and/or take into account the quantity penetration prior to the first model year. See the spreadsheets in Appendix E for examples of the postprocessing equations.)

D-2. INDEX USAGE

a. Upper Limits and Indices

(1) S Total number of sites.

(2) s Site index, where $s = 1,2,...,S$.

(3) E Total number of different ECO.

(4) e ECO index, where $e = 1,2,...,E$.

(5) T Total number of years in the planning period.

(6) t Planning year index, where $t = 1,2,...,T$.

(7) i Objective function component, where $i = 1,2,3,4$.

b. Note on the Dimensionality of the Study. In the core spreadsheets configuration, the total numbers S, E, and T of sites, ECO, and planning years are respectively 50, 54, and 12. The 12 planning years are from FY 94 through FY 05. The decision variables below are indexed by all three of s, e, and t. Hence there are (50)(54)(12) = 32,400 decision variables. An economies of scale ECO contains an additional (50)(12) decision variables, indexed by s and t, and has 12 binary variables indexed by t.

D-3. DATA

a. ECO-Specific Data

(1) IC_{se} Initial cost for a 1 percent replacement of old technology at site s by ECO e.

(2) CS_{set} Cost savings from a 1 percent replacement of old technology at site s by ECO e in year t. Yearly differences in this element occur in scenarios where energy prices fluctuate differently than the rate of inflation.

(3) ES_{se} Energy savings from a 1 percent replacement of old technology at site s by ECO e.

(4) DS_{se} Demand savings from a 1 percent replacement of old technology at site s by ECO e.

(5) VS_{se} Environmental savings (pollution abated) from a 1 percent replacement of old technology at site s by ECO e.

(6) RP_{se} Remaining percent investment potential at the start of the planning period at site s of ECO e.

b. Budget Data

(1) BG_t Budget for year t.

(2) RO fraction of the previous year's cost savings that can be rolled over to supplement current year's budget.

c. Objective Function Data

W_i Weight of objective function component.

d. Optional Data Examples

(1) *XES* Indicates the objective function result from a maximized energy saving optimization to be maintained in a subsequent cost savings maximization. The purpose of the second optimization is to maximize cost savings without lowering the previously achieved energy savings.

(2) *AE* Minimum fraction of energy saving improvement over energy savings of ECO penetration before planning period. For example, if $AE = .5$, the additional energy savings for the last planning year (FY 05) is required to be at least 50 percent of that achieved in the year before the planning period (FY 93).

e. Economies of Scale Data

(1) QU_{se} Quantity (e.g., number of items, or of square feet) invested in by a 1 percent replacement of old technology at site s by ECO e.

(2) QR_e Quantity investment requirement for ECO e before price reduction.

(3) FR_e Fraction used to get the reduced cost from the initial cost for ECO e. For example, if the initial cost of a 1 percent implementation of e is $10,000 and FR_e is .9, the reduced cost of a 1 percent implementation would $9,000.

(4) TX_e Technical "big" number used to prevent premature investment in ECO e at the reduced price. Number must be big enough to avoid restricting lower price buys in year t when binary variable for year t is one in the "Restrict if Zero" constraints below.

D-4. DECISION AND BINARY VARIABLES

a. X_{set} Percent of the total quantity at site s of ECO e invested in during year t. (Total quantity includes the amount invested in the new technology ECO by the start of the planning period.)

b. Y_{set} For ECO with economies of scale data, the percent of the total quantity at site s of ECO e invested in during year t at the higher price.

c. Z_{set} For ECO with economies of scale data, the percent of the total quantity at site s of ECO e invested in during year t at the reduced price.

d. BI_{et} For ECO with economies of scale data, the binary variable that prevents premature investment at the lower price in ECO e in year t.

D-5. CUMULATION EXPRESSIONS

a. Cumulative Additional Percent Investments. Most of the expressions below involve CU_{set}, the cumulative additional percent investment at site s in ECO e through year t.

$$\text{For } s = 1,\ldots,S\,;\ e = 1,\ldots,E\,;$$
$$CU_{set} = \begin{cases} X_{set} & t = 1 \\ CU_{se(t-1)} + X_{set} & t = 2,\ldots,T. \end{cases}$$

For economies of scale ECO, $Y_{set} + Z_{set}$ is used instead of X_{set} in the definition of CU_{set}

b. Cumulative Additional Percent Investments at the Higher Price. The constraints in paragraphs D-7c and D-7d(1) below involve CV_{set}, the cumulative additional percent investment at site s in ECO e through year t at the unreduced price. These expressions pertain to economies of scale ECO.

$$\text{For } s = 1,\ldots,S\,;\ e = 1,\ldots,E\,;$$
$$CV_{set} = \begin{cases} Y_{set} & t = 1 \\ CV_{se(t-1)} + Y_{set} & t = 2,\ldots,T. \end{cases}$$

D-6. OBJECTIVE FUNCTIONS.

The objective function is:

Maximize

$$W_1 \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} CS_{set}CU_{set} + W_2 \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} ES_{se}CU_{set} + .$$
$$W_3 \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} DS_{se}CU_{set} + W_4 \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} VS_{se}CU_{set}$$

Often, in practice, the weights of three of the four components are each zero, so that the objective function is equivalent to one of the following:

a. Maximize Cost Savings

$$\text{Maximize} \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} CS_{set} CU_{set} .$$

b. Maximize Energy Savings

$$\text{Maximize} \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} ES_{se} CU_{set} .$$

c. Maximize Demand Savings

$$\text{Maximize} \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} DS_{se} CU_{set} .$$

d. Maximize Environmental Savings

$$\text{Maximize} \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} VS_{se} CU_{set} .$$

D–7. CONSTRAINTS

a. Annual Investment Dollar Constraints

$$\sum_{e=1}^{E}\sum_{s=1}^{S} IC_{se} X_{set} \le \begin{cases} BG_t & t=1 \\ BG_t + RO * \sum_{e=1}^{E}\sum_{s=1}^{S} CS_{se(t-1)} CU_{se(t-1)} & t = 2,\ldots,T. \end{cases}$$

For economies of scale ECO, $Y_{set} + FR_e * Z_{set}$, is used instead of X_{set} in these constraints.

b. Total Planning Period Investment Limited by Remaining Potential at Start

$$CU_{seT} \le RP_{se} \quad \text{For } s = 1,\ldots,S \text{ ; } e = 1,\ldots,E \text{ ;}$$
note $t = T$ (FY05).

c. Quantity of Investment at Higher Price Limited to Requirement

$$\sum_{s=1}^{S} QU_{se} CV_{seT} \le QR_e \quad \text{For } e = 1,\ldots,E \text{ ;}$$
note $t = T$ (FY05).

d. **Binary Constraints**

(1) **"Keep at Zero" Constraints.** These expressions force the binary variable for ECO e in year t to 0, if the quantity requirement at the unreduced price has not yet been met.

$$\sum_{s=1}^{S} QU_{se}CV_{set} - (QR_e * BI_{et}) \geq 0, \text{ for } e = 1,\ldots,E; \quad t = 1,\ldots,T.$$

(2) **"Restrict if Zero" Constraints.** These expressions prevent buying ECO e at the reduced price in year t, unless the binary variable BI_{et} is allowed to assume the value 1 by the "Keep at Zero" constraints above.

$$(TX_e * BI_{et}) - \sum_{s=1}^{S} IC_{se}Z_{set} \geq 0, \text{ for } e = 1,\ldots,E; \quad t = 1,\ldots,T.$$

e. **Maintain First Objective.** (Example of optional sequential programming to improve a secondary objective function while maintaining the primary objective function value found in the initial optimization.)

$$\sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} ES_{se}CU_{set} \geq XES.$$

f. **Minimum Fraction Energy Saving Improvement.** (Example of optional constraint designed to force achieving a predetermined energy savings.)

$$\sum_{e=1}^{E}\sum_{s=1}^{S} ES_{se}CU_{seT} \geq AE * \sum_{e=1}^{E}\sum_{s=1}^{S} ES_{se}(100 - RP_{se}),$$

note $t = T$ (FY05).

APPENDIX E

SPREADSHEET IMPLEMENTATION OF THE REEP INVESTMENT MODEL (RIM)

E-1. INTRODUCTION. This appendix provides examples of the EXCEL 4.0 spreadsheets of RIM. It also indicates some relationships between RIM as mathematically described in Appendix D and the spreadsheet implementation. The core version of RIM resides on 55 spreadsheets. For each of 54 ECO, there is a spreadsheet containing data and logic specific to that ECO. The 55th or main spreadsheet contains links to the other 54 spreadsheets. The first four tables of this appendix display the values view and the formulas view of one of the ECO spreadsheets and of the main spreadsheet of the core version of RIM. The last four tables display the ECO and the main spreadsheet of the economies of scale prototype. Again both the value views and formula views of each spreadsheet are presented. For easier reading, the input data and the decision cells have been set to zero in the formula views. In the values views, the spreadsheets reflect the input and output of cost savings maximizations. Spreadsheets described in the following paragraphs are illustrated in Tables E-1 through E-8 which appear at the end of this appendix.

E-2. CORE SPREADSHEETS

a. Core ECO Spreadsheet (r22F01, Tables E-1 and E-2). The 54 ECO spreadsheets in the current core version of RIM are labeled r22F01, r22F02,...,r22F54. Tables E-1 and E-2 display the values view and the formulas view, respectively, of r22F01.

(1) Data. The data pertaining to a particular ECO (i.e., those indexed by e in Appendix D) such as,

IC_{se} Initial cost for a 1 percent replacement of old technology at site s by ECO e,

are shown on the ECO spreadsheets. For example, spreadsheet cell B11 of r22F01 shows $77,239 as the initial cost of a 1 percent replacement of old technology by ECO 1 at site 1.

(2) Decision Variables. Each decision variable pertains to a particular ECO (i.e., is indexed by e in Appendix D) and appears on an ECO spreadsheet.

(3) Formulas

(a) Expressions containing variables pertaining to, but not summed over the ECO (i.e., those in Appendix D that contain the phrase, $e = 1,\ldots,E$), are implemented in formulas on the ECO spreadsheets. One such expression is:

$$CU_{set} = CU_{se(t-1)} + X_{set},$$
$$\text{for } s = 1,\ldots,S\,;\ e = 1,\ldots,E;$$
$$t = 2,\ldots,T.$$

It is implemented for $e = 1$, on the spreadsheet r22F01 in the 50 cells C191, C192,...,C240, for $s = 1,\ldots,S=50$, and $t = 2$.

(b) Expressions summed over the ECO (i.e., those in Appendix D that contains a summation, $\sum_{e=1}^{E}$, over e), such as

$$\text{Maximize} \sum_{t=1}^{T}\sum_{e=1}^{E}\sum_{s=1}^{S} CS_{set}CU_{set}$$

are implemented in formulas on the main spreadsheet, but obtain partial values from ECO spreadsheets. For example, the above maximization expression obtains the value of $\sum_{s=1}^{S} CS_{set}CU_{set}$ for e=1, t=1, from cell B482 of r22F01.

b. Core Main Spreadsheet (r22LK, Tables E-3 and E-4). The main spreadsheet contains data and logic that pertain to the ECO as a group.

(1) Data. The main spreadsheet contains the data that does not pertain to individual ECO (i.e., those in Appendix D not index by e). For example:

(a) BG_t Budget for year t.

(b) RO fraction of the previous year's cost savings that can be rolled over to supplement current year's budget.

(c) W_i Weight of objective function component.

(2) Formulas. Expressions that represent summations across ECO, or that are independent of ECO (i.e., those in Appendix D that do not contain the phrase $e = 1,2,...,E$) are implemented on the main spreadsheet. For example cell, B56 contains the spreadsheet expression of the formula

$$BG_t - \sum_{e=1}^{E}\sum_{s=1}^{S} IC_{se}X_{set}, \text{ for } t = 1 \text{ (FY 94)}.$$

The optimization process requires this expression to be non-negative, thus implements the constraint:

$$\sum_{e=1}^{E}\sum_{s=1}^{S} IC_{se}X_{set} \leq BG_t, \text{ for } t = 1.$$

The spreadsheet expression of cell B56 uses cell B27 which contains the value of

$$\sum_{e=1}^{E}\sum_{s=1}^{S} IC_{se}X_{set}, \text{ for } t = 1 \text{ (FY 94)}.$$

Cell B27 uses cells B64, B65,...,B117. Each of the cells B64, B65,...,B117 is linked to an ECO spreadsheet and contains the value of

$$\sum_{s=1}^{S} IC_{se}X_{set}, \quad \text{for } t = 1 \text{ (FY 94) for a fixed ECO.}$$

E-3. ECONOMIES OF SCALE SPREADSHEETS

a. Economies of Scale ECO Spreadsheet (r91G01, Tables E-5 and E-6)

(1) Data. All the economies of scale data in Appendix D are index by e and thus appear on the ECO spreadsheets. That data is:

(a) QU_{se} Quantity of ECO e available for investment at site s.

(b) QR_e Quantity investment requirement for ECO e before price reduction.

(c) FR_e Fraction used to get reduced price from initial price for ECO e.

(d) TX_e Technical "big" number used to prevent premature investment in ECO e at the reduced price.

(2) Decision and Binary Variables. All these variables in Appendix D are indexed by e and appear on the ECO spreadsheets.

(3) Formulas. All the economies of scale expressions in Appendix D contain the phrase $e = 1,2,...,E$, and are thus implemented in formulas on the ECO spreadsheets. For example the "Keep at Zero" binary constraints:

$$\sum_{s=1}^{S} QU_{se}Y_{set} \; - \; (QR_e * BI_{et}), \text{ for } e = 1,...,E;$$
$$t = 1,...,T.$$

are implemented in cells B245, C245,...,M245 on the ECO spreadsheets.

b. Economies of Scale Main Spreadsheet (r91GLK, Tables E-7 and E-8). This prototype spreadsheet, r91GLK, is similar to core main spreadsheet, r22LK, from spreadsheet rows 1 through 64. From rows 65 on in the core spreadsheet, there are more linking cells to the ECO spreadsheets. The prototype contains links to one spreadsheet, whereas the core spreadsheet has links to 54 spreadsheets.

E-4. OVERVIEW OF RIM SPREADSHEET IMPLEMENTATION

a. This paragraph describes some of the components and operating characteristics of RIM. It is intended to provide an overview of portions of the model's structure. It is not intended to serve as instructional documentation covering all aspects of model construction and operation.

b. Figure E-1 is a conceptual depiction of RIM's basic structure. RIM incorporates these three basic sequential processing steps: preprocessing and applying data, optimizing the selected objective function, and post-processing results. RIM processing is accomplished on the Macintosh and RISC computer systems using a combination of standard and CAA developed software programs. The three basic RIM processing steps are briefly described and illustrated below.

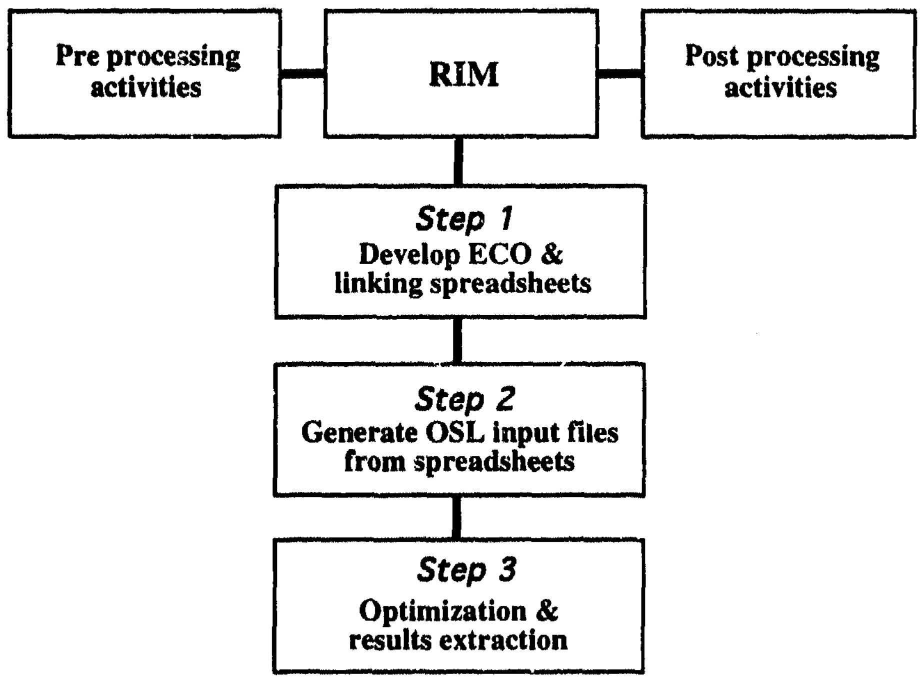
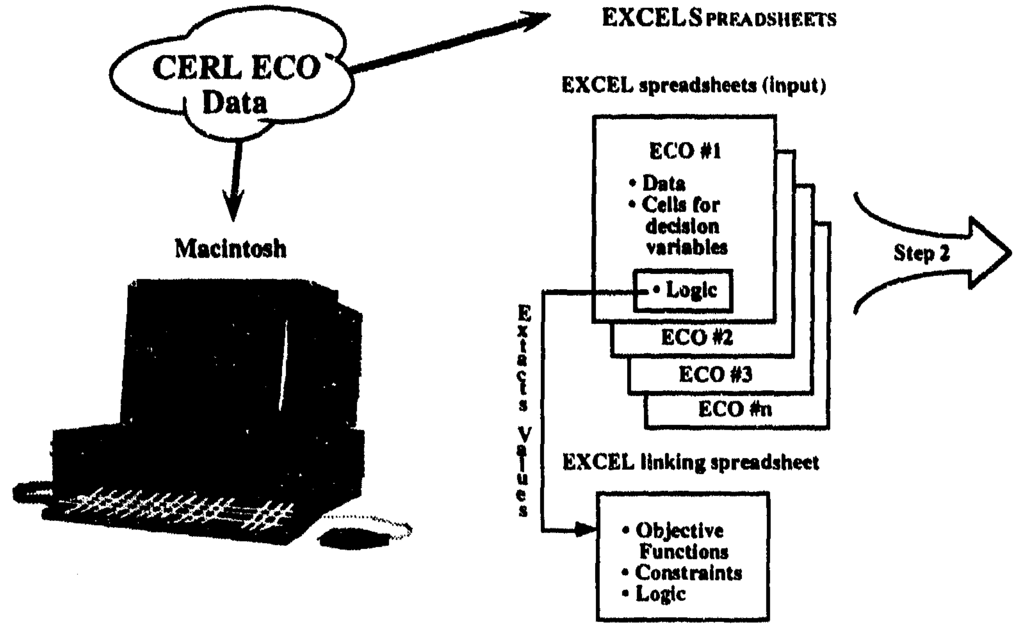


Figure E-1. RIM Architecture

(1) Step 1, Figure E-2. This step entailed developing Microsoft EXCEL spreadsheets on the Macintosh computer. "ECO Spreadsheets" were used for ECO specific data and logic. The spreadsheet referred to as the "Linking Spreadsheet" was used for data and logic pertaining to the ECO as a group such as the objective functions and budgetary constraints.

(2) Step 2, Figure E-3. Second step RISC processing used an in-house spreadsheet optimization tool called "Relay" for converting ECO and Linking spreadsheet data and formulas into two Optimization Subroutine Library (OSL) compatible input files (the Index File and Right-hand Side File).



• **Data inputs**	• **Logic (equations)**
- Initial cost of 1% investment	- % cumulative investment above start
- Annual energy savings @ 1% investment	- Annual implementation costs
- Annual demand savings @ 1% investment	- Annual energy savings
- Annual cost savings of a 1% investment	- Annual demand savings
- Annual environmental savings @ 1% investment	- Annual cost savings
- % ECO available at start	- Annual environmental savings
	- Objective functions
	- Investment budget constraints
	- Investment from cost savings rollover
• **Cells for decision variables**	

Figure E-2. RIM Processing Step 1—Develop ECO and Linking Spreadsheets

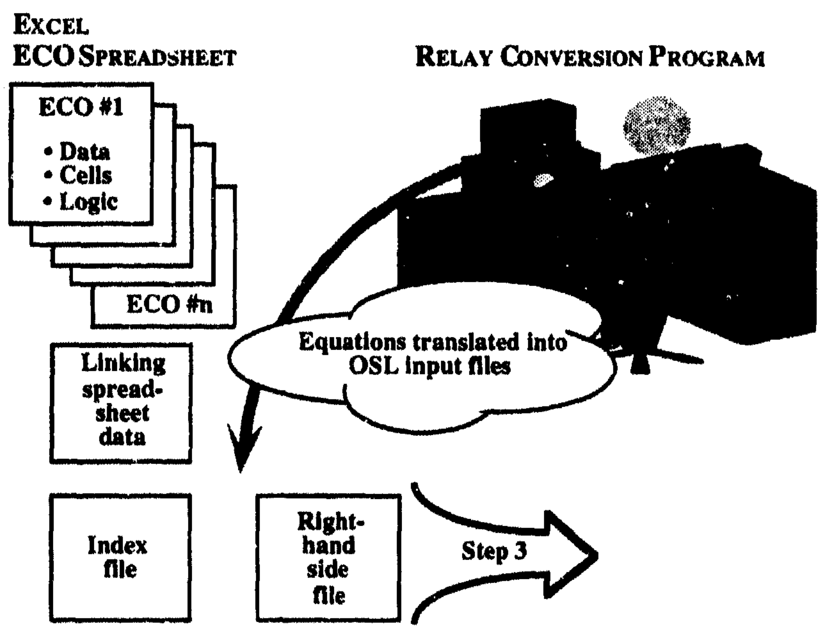


Figure E-3. RIM Processing Step 2—Generate Input Files for the Optimizer

(3) **Step 3, Figure E-4.** The OSL Program processes the Relay-developed input files and maximizes the selected objective function. A "C" program and EXCEL macro portion of Relay are used for extracting and transferring OSL decision variable values to the appropriate areas of the ECO spreadsheets.

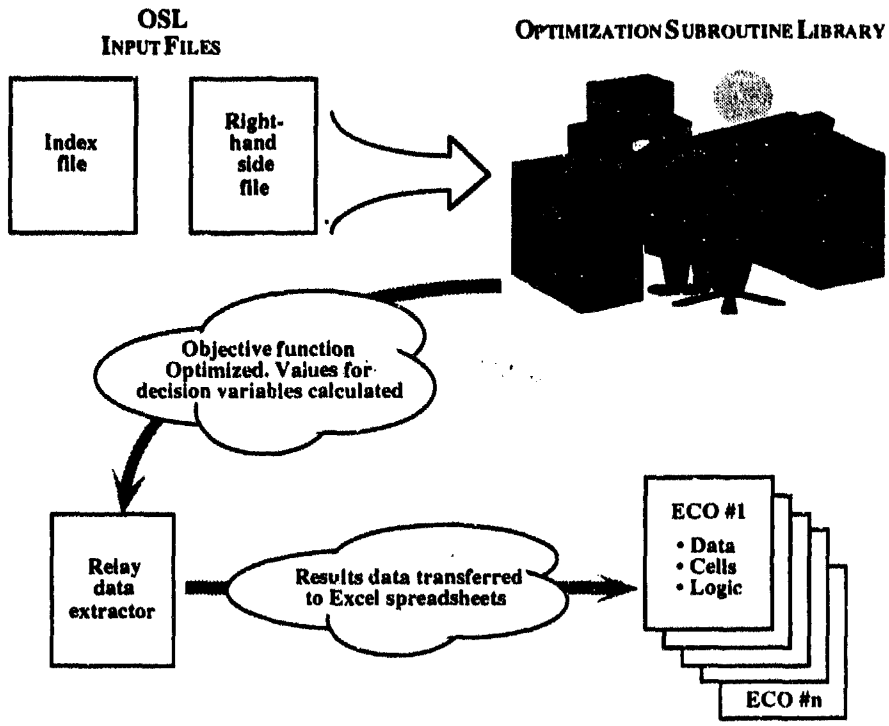


Figure E-4. RIM Processing Step 3—OSL Processing and Extracting Results

E-5. GENERAL DESCRIPTIONS OF ECO SPREADSHEET DATA AND PROCESSING LOGIC

a. General

(1) RIM was structured to determine the optimum ECO and site-specific investment strategy for maximizing any one of four possible alternative objective functions. While optimizing the selected objective function, the model also specifies the resultant values for each of the three alternative objective functions not selected for optimization.

(2) The values of nonselected objective functions are likely sub-optimized as a result of the model's focus on the primary objective function. These nonselected objective functions may be optimized during successive model iterations within a hierarchy of constraints imposed by preceding optimizer results.

(3) RIM output specifies the total as well as the ECO/site-specific economic and environmental impacts of investing in ECO. RIM results represent the optimum Army investment strategy for investing in a range of pre-selected ECOs among several predetermined sites in the manner which maximizes the objective function.

b. Spreadsheet Proper. A separate ECO spreadsheet program containing site specific ECO performance and cost data, operating logic (equations), and cells for decision variable values was prepared for each ECO evaluated in the Model (47 spreadsheets for the base case run). A sample ECO spreadsheet is illustrated at Table E-1. Descriptions of the specific ECO spreadsheet elements provided below are keyed to the indicated portions of the sample illustration.

- Item # 1, This column identifies Army sites for which data is displayed.
- Item # 2, "Init Cost 1 Percent Invest." Initial (one-time) cost of implementing a 1 percent increment of the designated ECO at the indicated site. This cost is expressed in FY 93 K dollars and is derived from data reported by CERL. The use of 1 percent rather than 100 percent is a data scaling consideration. Current scaling permits a 34.5 percent decision value, for example, to be returned from the optimizer as 34.5 percent.

- Item # 3, "Annual Energy Sav 1 Percent Invest." The annual energy savings resulting from a 1 percent implementation of the specified ECO at the indicated site. Energy savings are expressed as thousands of Mbtu and may be positive or negative according to the ECOs' net overall impact upon facility systems.

- Item # 4, "Annual Demand Sav 1 Percent Invest." The annual kilowatt savings for electrical demand charges resulting from a 1 percent implementation of the specified ECO at the indicated site. The cost of electricity is, in large part, determined by the time of day during which the electricity is consumed. Electricity consumed during the utilities' peak demand hours usually costs significantly more than an equal amount of electricity consumed during off peak hours. Because the rate structures used for determining demand charges are so complex and vary widely among servicing utilities, these annualized demand rates were developed for use in analysis. This data element was reported by CERL.

- Item # 5, "Annual Envir Sav 1 Percent Invest." The annual amount of reduction in atmospheric pollution resulting from a 1 percent implementation of the designated ECO at the indicated site. The amount of atmospheric pollutants abated is expressed as short tons (STONS). Specific pollutants included in this data element are sulfur dioxide (SO2), nitrogen dioxide (NO2), carbon monoxide (CO), carbon dioxide (CO2), particulates, and hydrocarbons. This data element was reported by CERL and converted to a percentage value for model processing.

- Item # 6, "Percent Left from Start." Percent of opportunities remaining to be implemented for the designated ECO measure at the indicated site. This data element excludes that portion of the indicated ECO measure estimated to have already been completed (implemented) at the indicated site at the start of the planning period. This data element was derived by applying the results of CAA market penetration surveys to ECOs provided by CERL.

- Item # 7, "Investment Percent Limit Logic." This item contains constraints that limit the ECO investment to the potential at the start of the planning period.

- Item # 8, "Annual Cost Savings (1 Percent Investment)." The annual operating cost savings resulting from a 1 percent implementation of the designated ECO at the indicated site for the indicated year. Annual cost avoidance/savings are expressed in FY 93 K dollars. Annual cost avoidance projections represent the total net cost impact which is estimated to occur from a 1 percent investment in the ECO. As appropriate,

this cost data was adjusted during pre-processing analysis to reflect alternative pricing and inflation assumptions (e.g., fuel price increase of 3 percent above the inflation rate).

- Item # 9, "Decision Cells–Percent Investment." Contains the ECO investment decisions generated by the optimizer (OSL) in Step 3. Optimizer investment decisions are shown as an incremental percent (not cumulative) by year at a given site.

- Item # 10, "Cumulative Percent investment above the starting level." Contains the logic for calculating and displaying the cumulative results of implementing annual investment decisions generated by the optimizer in Step 3 and reflected in Item # 9. Values are expressed as a percent of the total number of ECO opportunities at a given site.

- Item # 11, "Annual implementation costs." Cells contain the program logic for calculating and displaying the annual cost in K dollars of implementing optimizer-generated ECO decisions (Item # 9) at designated sites.

- Item # 12, "Annual Energy Savings." Cells contain the program logic for calculating and displaying the annual energy savings resulting from implementing optimizer-generated ECO decisions. Energy savings are displayed in thousands of Mbtu.

- Item # 13, "Annual Demand Savings." Cells contain the program logic for calculating and displaying the annual electrical demand savings resulting from optimizer-generated ECO investment decisions (Item # 9) at designated sites. Electrical demand savings are based on reductions and/or shifts in electrical demand pattern and may not be directly related to amount of energy consumption. Demand savings are expressed in kilowatts (kW) of electricity.

- Item # 14, "Annual Cost Savings." Cells contain the program logic for calculating and displaying the total annual cost savings in K dollars of implementing optimizer-generated ECO investment decisions (Item # 9) at designated sites.

- Item # 15, "Annual Environmental Savings." Cells contain the program logic for calculating and displaying the annual short tonnage of atmospheric pollution reduction resulting from implementing optimizer-generated ECO decisions (Item # 9) at designated sites.

c. Post Processing. Initial data postprocessing is done using a "C" language program and Excel macro to extract and transfer RIM results to areas of the ECO Spreadsheets. This creates the output version of ECO spreadsheets which includes results. These postprocessing data elements are described below as P1 through P7.

- Item # P1, "Data: Quantity Fixtures/Opportunities." This data expresses the total number of ECO at the specified site to include any portion of ECO which may have been previously implemented (as identified by market penetration surveys). This data was provided by CERL.

- Item # P2, "Logic: Percent FY 93 Penetration." This logic element expresses the percent of the total ECOs which have been previously implemented at the specified site and, as such, are not available for implementation in the model simulation. CAA developed this data from market penetration surveys.

- Item # P3, "Logic: Quantity FY 93 Penetration." This logic element expresses the quantity of the ECOs which have been previously implemented at the specified site and, as such, are not available for investment by the model during simulation. This value is the product of the total number of ECOs (P1) and the percent of existing market penetration for that ECO (P2).

- Item # P4, "Cumulative Quantity Penetration Above the FY 93 Penetration." This logic element expresses the annual cumulative quantity of additional ECO investment made by the model during simulation. This value, which reflects model investment decisions, cannot exceed the total number of remaining ECO, (P1 value minus P3 value).

- Item # P5, "Quantity FY 93 Penetration by ECO." This logic element expresses the total quantity of ECOs which have been previously implemented at all sites addressed in the study. This value is the sum of all values appearing in Item # P3.

- Item # P6, "Cumulative Quantity Penetration by ECO Above the FY 93 Penetration." This logic element expresses the total number of additional ECOs implemented annually during model simulation. These values are the annual summation for all values appearing in Item # P4 .

- Item # P7, "Cumulative Quantity Penetration by ECO." This logic element expresses the cumulative total number of ECOs (in "eaches") implemented annually to include the amounts for preexisting market penetration and annual model simulated implementation. These values are obtained by adding the amount of preexisting market penetration (Item # P5) to each annual value expressed in Item # P6.

E-6. GENERAL DESCRIPTIONS OF MAIN (LINKING) SPREADSHEET DATA AND LOGIC

a. General. The main or linking spreadsheet contains the logic (expressed by equations) for applying the model objective function and for imposing budgetary constraints during processing. This spreadsheet provides the operator/decisionmaker with a centralized method for selecting and uniformly applying objective functions during model processing. It also allows appropriate operating constraints to be set without having to alter the structure, data, and formulas of the individual ECO spreadsheets.

b. Spreadsheet Proper. This paragraph discusses the main spreadsheet except for the post processing portion. The descriptions below are numerically keyed to the indicated portions of the spreadsheet sample illustration appearing at Table E-3. Some items involving energy, demand, or environment savings are omitted, when they are similar to described cost savings items.

- Item # 1, "Fraction for Cost Savings Rolled Over." This is the fraction of the dollar cost savings (Item # 6) which will be retained and applied to fund implementation of ECO program measures the following year.

- Item # 2, "Annual Investment Funding Limitations (Budget) in K Dollars." This gives the annual dollar amounts that are programmed and budgeted for ECO implementation.

- Item # 3, "Weights for Objectives." These four data elements give the weights of the four components of the objective function.

- Item # 4, "Multiple Objective Function." This single cell item shows the value of the objective function. (The actual formula contained in the cell is shown in Table E-4.)

- Item # 5, "Total Annual Investment Costs." This logic field expresses the total annual dollar investment amounts in K dollars. The model determines these amounts by summing the annual ECO investments of Item # 10 below.

- Item # 6, "Total Annual Cost Savings." This logic field expresses the total annual cost savings in K dollars which are generated by model implementation of ECO measures. The model determines these amounts by summing the annual cost savings by ECO of Item # 11 below.

- Item # 7, "Grand Total Cost Savings (in K dollars)." This single cell item contains the formula for the sum of the annual cost savings.

- Item # 8, "Annual Budget + Cost Savings Rolled Over from Previous Year." This logic field calculates total annual budgets available for funding ECO measures by adding any assumed rollover of cost savings generated through implementation of ECO measures to the programmed/budgeted amount of Item # 2 above. The model calculates annual rollover amounts by multiplying annual cost savings by the assumed rollover factor of Item # 1. It is important to note that the model only begins to generate cost savings for ECO measures in the year following implementation.

- Item # 9, "Enforcement of Cost Limit (Annual Budget + Previous Year's Cost Savings)." This logic field imposes total annual budget constraints during model simulation to available amounts as shown in Item # 8 and displays any unused annual budget amounts.

- Item # 10, "Total Annual Investment Costs by ECO." This field displays the total annual investment cost for each ECO. The main spreadsheet extracts the data in this field from respective ECO spreadsheets (Table E-1, Item # 11).

- Item # 11. "Total Annual Cost Savings by ECO." This data field displays the total annual cost savings generated for each ECO. The main spreadsheet extracts the data in this field from respective ECO spreadsheets (Table E-1, Item # 8).

e. Post Processing Part. The main spreadsheet elements described below in Items # P1 through P3 concern the post processing of model results. These descriptions are also numerically keyed to the indicated portions of the spreadsheet sample illustration appearing at Table E-3.

- Items # P1. "Cumulative Quantity Penetration by ECO." This logic field expresses the total annual cumulative ECO quantity implemented, including the opportunities invested in before the model planning period.

- Item # P2. "Cumulative Quantity Penetration by ECO Above the FY 93 Penetration." This logic field expresses the total annual cumulative ECO quantity implemented, not including the opportunities invested in before the model planning period.

- Item # P3, "Percent of Final Penetration." The logic field gives the annual cumulative quantity penetration (above the penetration before the planning period) divided by cumulative quantity penetration (above the penetration before the planning period) in FY 05 (the last year of the planning period). This item gives an indication of the rate as which the ECO are implemented.

E-7. CONCEPTUAL REMARKS ON THE ECONOMY OF SCALE (EofS) SPREADSHEETS. Table E-5 and Table E-6 contain the value and the formula views respectively of the prototype EofS ECO spreadsheet. This spreadsheet illustrates the modifications necessary to implement an economy of scale methodology where investment costs per item decrease after an initial investment. For example, instead of one set of investment decision cells, the EofS ECO spreadsheet contains two sets. Investment decision cells contain annual percent investments, that is annual investments as a percentage of the total investment opportunities available before the initial implementation of the ECO. In an EofS ECO spreadsheet, one set contains the annual percent investments at the initial higher per item cost. The other set contains the annual percent investments at the lower per item cost. The EofS ECO spreadsheet also contains annual binary variables that prevent investment at the lower cost before fulfilling the quantity investment requirement at the higher cost. The technical details of the mathematical formulation implementing this appear in Appendix D. The EofS main spreadsheet is similar to Core main spreadsheet in that it obtains information from ECO spreadsheets. The value and formula views are given in Tables E-7 and E-8 of the prototype EofS main spreadsheet. It obtains information from just one EofS ECO spreadsheet.

Table E-1. Core ECO Spreadsheet - Value View (page 1 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		2X4FL	2x4 Fluorescent Lighting Retrofit					REC	REC	REC	REC	REC	REC
2		Data except column H											
3		Col B: Costs in 1000s of dollars		(CERL 100% data divided by 1000*100)									
4		Col C: Energy savgs in 1000s of MBtu's		(CERL 100% data divided by 1000*100)									
5		Col D: Demand savings in Kilowatts		(CERL 100% data divided by 100)									
6		See below for Cost Savings											
7		Col F: Environmental Savings in Tons		(CERL sum pollution abated 100%-data divided by 100)									
8			Annual	Annual		Annual	Percent	Investmnt					
9	6 Charset	Init_Cost	Energy_Sv	Demand_Sv		Envir_Sav	left_from	%_Limit					
10	Site Code	1%_invest	1%_invest	1%_invest		1%_invest	Start	Logic					
11	[illegible]	77.239029	0.8225008	72.6208		206.34628	85	0					
12	[illegible]	48.552425	0.517002	48.5632		192.96685	85	0					
13	CARSON	56.38559	0.8036396	56.014933		203.03632	85	0					
14	[illegible]	64.257653	0.4468058	52.535467		134.80758	85	0					
15	F_DIXN	43.6144	0.3701476	39.612267		66.775636	85	0					
16	F_HOOD	67.979399	0.8938959	71.0144		229.58662	85	0					
17	S_HOOD	56.399475	0.7497161	58.523733		189.93698	85	0					
18	IRWIN	18.434445	0.1560894	14.813667		14.694625	85	0					
19	LEWIS	0	0	0		0	0	0					
20	McCOY	32.329211	0.2982242	31.016533		68.581111	85	0					
21	McPHER	33.137656	0.4001337	36.228267		98.241171	85	0					
22	[illegible]	41.232266	0.378985	38.766933		99.276626	85	0					
23	FT_ORD	53.701376	0.3193078	45.466933		28.322716	85	0					
24	F_POLK	44.17777	0.5087644	39.5584		112.81134	85	0					
25	RILEY	47.786229	0.4774259	46.801067		134.90132	85	0					
26	[illegible]	0	0	0		0	0	0					
27	STWRT	29.709152	0.4177482	32.48		96.35346	85	0					
28	[illegible]	62.869742	0.8373866	66.842667		199.14369	85	0					
29	BLISS	70.43904	0.8596502	74.4128		224.46745	85	0					
30	FT_DIX	40.189073	0.3487325	38.3328		30.363455	85	0					
31	[illegible]	42.312312	0.4394232	39.7824		83.090688	85	0					
32	GORDON	60.37446	0.7564243	66.005333		181.5145	85	0					
33	HUACHU	47.858698	0.4173248	37.4976		60.62346	85	0					
34	JACKSN	52.604498	0.5889143	49.4592		86.901963	85	0					
35	F_KNOX	76.381347	0.732896	68.394667		273.64603	85	0					
36	[illegible]	35.313627	0.3539918	34.5856		99.448951	85	0					
37	FT_LEE	44.742411	0.4360617	42.0672		83.299913	85	0					
38	RUCKER	46.068164	0.6129222	47.607467		150.60256	85	0					
39	F_SILL	0	0	0		0	0	0					
40	[illegible]	66.767037	0.5521386	53.879467		182.20898	85	0					
41	[illegible]	5.3009513	0.0620987	5.6		15.60536	85	0					
42	CORP_C	6.6155672	0.1014622	6.9888		24.992586	85	0					
43	PINE_B	3.8967352	0.0487126	4.2112		10.491075	85	0					
44	[illegible]	0	0	0		0	0	0					
45	RED_RV	6.8700328	0.0828299	7.2576		21.503224	85	0					
46	ROCK_I	24.126277	0.214426	22.683733		31.181004	85	0					
47	TOOELE	7.3001445	0.0619361	7.0037333		25.398946	85	0					
48	[illegible]	4.2861864	0.0340334	3.9125333		6.0480036	85	0					
49	HO_AAP	5.0736656	0.056291	5.4208		14.181306	85	0					
50	LK_AAP	1.1629658	0.0116721	1.1349333		3.8833668	85	0					
51	RD_AAP	6.3017391	0.0587389	6.5109333		11.057585	85	0					
52	[illegible]	17.156499	0.1449488	15.9144		46.321838	85	0					
53	[illegible]	26.712908	0.2996544	32.285867		26.086122	85	0					
54	[illegible]	47.722697	0.5694509	50.414933		148.34901	85	0					
55	[illegible]	62.530736	0.5728273	61.2416		186.14614	85	0					
56	PICTNY	21.736109	0.1609998	19.682267		14.421945	85	0					
57	W_S_MR	20.904569	0.2335855	20.4736		64.256665	85	0					
58	[illegible]	6.7242289	0.0615066	6.5856		19.906651	85	0					
59	W_REED	62.812563	0.5942797	59.150933		158.48157	85	0					
60	[illegible]	54.939297	0.5054192	51.6544		96.541324	85	0					
61		The next row contains formulas that are not sent to the optimizer											
62	sum	1764.2482	16.032107	1691.9015		4450.4753							
63													
64	1	2	3	4		5	6	7					
65		Data											
66		Annual Cost Savings (1% investment)											
67		In 1000s of dollars											
68	8	(CERL 100% data divided by 1000*100											
69		with annual adjustments for energy prices increasing above inflation rate)											
70		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
71	[illegible]	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556	21.34556
72	[illegible]	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434
73	CARSON	10.3055	10.3055	10.3055	10.3055	10.3035	10.3055	10.3055	10.3055	10.3055	10.3055	10.3055	10.3055
74	[illegible]	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737
75	F_DIXN	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773
76	F_HOOD	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253
77	S_HOOD	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441
78	IRWIN	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059
79	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
80	McCOY	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604	6.6875604
81	McPH...	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225
82	[illegible]	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402
83	FT_ORD	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287
84	F_POLK	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951
85	RILEY	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452
86	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
87	STWRT	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616

Table E-1. Core ECO Spreadsheet - Value View (page 2 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
88	[illegible]	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919
89	BLISS	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761
90	FT_DIX	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585
91	[illegible]	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287
92	GORDON	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646	12.786646
93	HUACHU	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754
94	JACKSN	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256
95	F_KNOX	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065
96	LEONWD	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994
97	FT_LEE	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172
98	RUCKER	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933
99	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
100	[illegible]	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306
101	[illegible]	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567
102	COMP_C	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992
103	[illegible]	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391
104	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
105	[illegible]	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843
106	ROCK_I	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833
107	TOOELE	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261
108	[illegible]	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983
109	HQ_AAP	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049
110	LK_AAP	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676
111	RD_AAP	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034
112	[illegible]	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564
113	[illegible]	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974
114	[illegible]	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959
115	[illegible]	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978
116	[illegible]	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154
117	[illegible]	5.5908998	5.5908998	.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998
118	[illegible]	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059
119	[illegible]	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236
120	[illegible]	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424
121		The next row contains formulas that are not sent to the optimizer											
122	sum	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185
123													
124													
125													
126													
127													
128	9	Decision cells - Percent investment											
129													
130		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
131	[illegible]	0	0	85	0	0	0	0	0	0	0	0	0
132	[illegible]	0	0	85	0	0	0	0	0	0	0	0	0
133	[illegible]	0	0	0	0	85	0	0	0	0	0	0	0
134	[illegible]	0	85	0	0	0	0	0	0	0	0	0	0
135	F_DRUM	0	85	0	0	0	0	0	0	0	0	0	0
136	F_HOOD	0	85	0	0	0	0	0	0	0	0	0	0
137	S_HOUS	0	85	0	0	0	0	0	0	0	0	0	0
138	IRWIN	85	0	0	0	0	0	0	0	0	0	0	0
139	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
140	MCCOY	0	0	0	85	0	0	0	0	0	0	0	0
141	[illegible]	0	85	0	0	0	0	0	0	0	0	0	0
142	[illegible]	0	0	0	85	0	0	0	0	0	0	0	0
143	FT_ORD	0	85	0	0	0	0	0	0	0	0	0	0
144	F_POLK	0	0	0	0	0	85	0	0	0	0	0	0
145	RILEY	0	0	85	0	0	0	0	0	0	0	0	0
146	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
147	STEWRT	0	85	0	0	0	0	0	0	0	0	0	0
148	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0
149	BLISS	0	85	0	0	0	0	0	0	0	0	0	0
150	FT_DIX	0	85	0	0	0	0	0	0	0	0	0	0
151	[illegible]	0	0	85	0	0	0	0	0	0	0	0	0
152	GORDON	0	0	0	85	0	0	0	0	0	0	0	0
153	HUACHU	0	0	85	0	0	0	0	0	0	0	0	0
154	JACKSN	0	12.266207	72.733793	0	0	0	0	0	0	0	0	0
155	F_KNOX	0	0	0	85	0	0	0	0	0	0	0	0
156	LEONWD	0	0	0	0	85	0	0	0	0	0	0	0
157	FT_LEE	0	0	0	85	0	0	0	0	0	0	0	0
158	RUCKER	0	0	85	0	0	0	0	0	0	0	0	0
159	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
160	[illegible]	0	0	0	32.33741	52.66259	0	0	0	0	0	0	0
161	[illegible]	0	0	85	0	0	0	0	0	0	0	0	0
162	COMP_C	0	0	85	0	0	0	0	0	0	0	0	0
163	[illegible]	0	0	85	0	0	0	0	0	0	0	0	0
164	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
165	[illegible]	0	85	0	0	0	0	0	0	0	0	0	0
166	ROCK_I	0	85	0	0	0	0	0	0	0	0	0	0
167	TOOELE	0	0	85	0	0	0	0	0	0	0	0	0
168	[illegible]	0	85	0	0	0	0	0	0	0	0	0	0
169	HQ_AAP	0	85	0	0	0	0	0	0	0	0	0	0
170	LK_AAP	0	0	0	0	85	0	0	0	0	0	0	0
171	RD_AAP	0	0	0	0	85	0	0	0	0	0	0	0
172	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0
173	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0
174	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0

Table E-1. Core ECC Spreadsheet - Value View (page 3 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
175	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0
176	[illegible]	85	0	0	0	0	0	0	0	0	0	0	0
177	W_S_MR	0	0	85	0	0	0	0	0	0	0	0	0
178	[illegible]	0	0	0	85	0	0	0	0	0	0	0	0
179	[illegible]	0	0	0	85	0	0	0	0	0	0	0	0
180	[illegible]	0	0	0	85	0	0	0	0	0	0	0	0

10

Cumulative % investment above the starting level

		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
191	[illegible]	0	0	85	85	85	85	85	85	85	85	85	85
192	[illegible]	0	0	85	85	85	85	85	85	85	85	85	85
193	[illegible]	0	0	0	0	85	85	85	85	85	85	85	85
194	[illegible]	0	85	85	85	85	85	85	85	85	85	85	85
195	F_DRUM	0	85	85	85	85	85	85	85	85	85	85	85
196	F_HOOD	0	85	85	85	85	85	85	85	85	85	85	85
197	S_HOUS	0	85	85	85	85	85	85	85	85	85	85	85
198	[illegible]	85	85	85	[illegible]	85	85	85	85	85	85	85	85
199	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
200	MCCOY	0	0	1	85	[illegible]	85	85	85	85	85	85	85
201	[illegible]	0	85	8	[illegible]	[illegible]	85	85	85	85	85	85	85
202	[illegible]	0	0	[illegible]	[illegible]	[illegible]	85	85	85	85	85	85	85
203	[illegible]	0	[illegible]	85	[illegible]	[illegible]	85	85	85	85	85	85	85
204	F_POLK	0	0	0	[illegible]	[illegible]	85	85	85	85	85	85	85
205	RILEY	0	[illegible]	85	[illegible]	[illegible]	85	85	85	85	85	85	85
206	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0	[illegible]	0	0
207	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	85	85	85	85	[illegible]	85	85
208	[illegible]	85	85	[illegible]	[illegible]	[illegible]	85	85	85	85	85	85	85
209	[illegible]	0	85	[illegible]	85	[illegible]	85	85	[illegible]	85	[illegible]	[illegible]	85
210	PT_DIX	0	45	[illegible]	85	85	[illegible]	85	[illegible]	[illegible]	[illegible]	85	85
211	[illegible]	0	0	[illegible]	85	[illegible]	45	85	85	85	[illegible]	85	85
212	[illegible]	0	0	0	85	[illegible]	[illegible]	85	85	85	[illegible]	[illegible]	85
213	[illegible]	0	0	85	[illegible]	[illegible]	85	85	85	85	85	[illegible]	85
214	[illegible]	0	12.268207	85	[illegible]	[illegible]	85	85	85	85	85	[illegible]	85
215	F_RUCK	0	0	0	[illegible]	85	85	85	85	85	85	[illegible]	[illegible]
216	[illegible]	0	[illegible]	0	0	[illegible]	[illegible]	85	85	85	85	85	85
217	PT_LEE	0	[illegible]	0	45	85	[illegible]	85	85	85	85	85	[illegible]
218	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	85	85	85	85	[illegible]	85
219	F_SILL	0	0	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	0
220	[illegible]	0	[illegible]	[illegible]	32.[illegible]	[illegible]	[illegible]	45	85	85	85	85	85
221	[illegible]	0	0	85	[illegible]	[illegible]	35	85	85	85	[illegible]	85	[illegible]
222	[illegible]	0	0	85	85	[illegible]	[illegible]	85	85	85	85	[illegible]	85
223	PINE_B	0	0	[illegible]	55	[illegible]	11	85	85	[illegible]	[illegible]	85	85
224	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
225	[illegible]	0	85	85	85	85	85	85	85	[illegible]	[illegible]	[illegible]	[illegible]
226	ROCK_I	0	85	85	85	85	85	85	85	85	85	85	[illegible]
227	TOOELE	0	0	85	85	85	85	85	85	[illegible]	85	85	85
228	[illegible]	0	85	85	85	85	85	85	85	85	[illegible]	85	[illegible]
229	[illegible]	0	85	85	85	85	85	85	85	85	85	85	85
230	LK_AAP	0	0	0	0	85	85	85	85	85	85	85	85
231	[illegible]	0	0	0	0	85	85	85	85	85	85	85	85
232	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
233	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
234	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
235	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
236	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
237	W_S_MR	0	0	85	85	85	85	85	85	85	85	85	85
238	[illegible]	0	0	0	85	85	85	85	85	85	85	85	85
239	[illegible]	0	0	0	85	85	85	85	85	85	85	85	85
240	[illegible]	0	0	0	85	85	85	85	85	85	85	85	85

11

Annual implementation costs
in 1000s of dollars

		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
251	[illegible]	0	0	6666.3175	0	0	0	0	0	0	0	0	0
252	[illegible]	0	0	4128.9561	0	0	0	0	0	0	0	0	0
253	[illegible]	0	0	0	0	4962.7752	0	0	0	0	0	0	0
254	[illegible]	0	5461.9175	0	0	0	0	0	0	0	0	0	0
255	F_DRUM	0	3707.224	0	0	0	0	0	0	0	0	0	[illegible]
256	F_HOOD	0	5776.2469	0	0	0	0	0	0	0	0	0	0
257	S_HOUS	0	4708.8703	0	0	0	0	0	0	0	0	0	0
258	[illegible]	1566.9276	0	0	0	0	0	0	0	0	0	0	0
259	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
260	MCCOY	0	0	0	2747.983	0	0	0	0	0	0	0	0
261	[illegible]	0	2816.7007	0	0	0	0	0	0	0	0	0	[illegible]

Table E-1. Core ECO Spreadsheet - Value View
(page 4 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
262	HINGE	0	0	0	3504.7428	0	0	0	0	0	0	0	0
263	FT_ORD	0	4864.617	0	0	0	0	0	0	0	0	0	0
264	P_POLK	0	0	0	0	0	3758.1105	0	0	0	0	0	0
265	KELLY	0	0	4081.8295	0	0	0	0	0	0	0	0	0
266	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
267	[illegible]	0	2525.2779	0	0	0	0	0	0	0	0	0	0
268	[illegible]	5352.4281	0	0	0	0	0	0	0	0	0	0	0
269	[illegible]	0	5967.3184	0	0	0	0	0	0	0	0	0	0
270	FT_DIX	0	3416.0712	0	0	0	0	0	0	0	0	0	0
271	[illegible]	0	0	3596.5466	0	0	0	0	0	0	0	0	0
272	[illegible]	0	0	0	5131.8291	C	0	0	0	0	0	0	0
273	[illegible]	0	0	4067.9857	0	0	0	0	0	0	0	0	0
274	[illegible]	0	646.25762	3826.1246	0	0	0	0	0	0	0	0	0
275	P_RICK	0	0	0	6492.4145	0	0	0	0	0	0	0	0
276	[illegible]	0	0	0	0	3001.6583	0	0	0	0	0	0	0
277	FT_LEE	0	0	0	3803.1049	0	0	0	0	0	0	0	0
278	[illegible]	0	0	3830.5381	0	0	0	0	0	0	0	0	0
279	P_SILL	0	0	0	0	0	0	0	0	0	0	0	0
280	[illegible]	0	0	0	2223.7479	3621.4503	0	0	0	0	0	0	0
281	[illegible]	0	0	460.58086	0	0	0	0	0	0	0	0	0
282	CORP_C	0	0	582.32491	0	0	0	0	0	0	0	0	0
283	PINE_B	0	0	331.22249	0	0	0	0	0	0	0	0	0
284	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
285	RED_RV	0	583.95279	0	0	0	0	0	0	0	0	0	0
286	ROCK_I	0	2050.7336	0	0	0	0	0	0	0	0	0	0
287	TOOELE	0	0	620.51228	0	0	0	0	0	0	0	0	0
288	[illegible]	0	364.22584	0	0	0	0	0	0		0	0	0
289	HD_AAP	0	431.26157	0	0	0	0	0	0		0	0	0
290	LK_AAP	0	0	0	0	100.5521	0	0	0	0	0	0	0
291	RD_AAP	0	0	0	0	335.64782	0	0	0	0	0	0	0
292	[illegible]	1458.3024	0	0	0	0	0	0	0	0	0	0	0
293	[illegible]	3036.8717	0	0	0	0	0	0	0	0	0	0	0
294	[illegible]	4086.4293	0	0	0	0	0	0	0	0	0	0	0
295	[illegible]	5316.1125	0	0	0	0	0	0	0	0	0	0	0
296	[illegible]	1647.7393	0	0	0	0	0	0	0	0	0	0	0
297	[illegible]	0	0	1776.8884	0	0	0	0	0	0	0	0	0
298	[illegible]	0	0	0	571.55928	0	0	0	0	0	0	0	0
299	[illegible]	0	0	0	5347.1679	0	0	0	0	0	0	0	0
300	[illegible]	0	0	0	4660.8402	0	0	0	0	0	0	0	0
301			sumproduct formulas are used in next row										
302	Tot_An_Co	22832.511	43041.777	33818.827	34492.789	12222.084	3758.1105	0	0	0	0	0	0
303	(total annual costs in1000s of dollars)												
304			(The optimizer uses the long sumproduct formula,										
305			the side-by-side components above the sumproduct are given for the user.)										
306													
307													
308	12	Annual Energy Savings											
309		in 1000s of MBtu's											
310		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
311	[illegible]	0	0	69.913079	69.913079	69.913079	69.913079	69.913079	69.913079	69.913079	49.913079	69.913079	69.913079
312	[illegible]	0	0	43.94517	43.94517	43.94517	43.94517	43.94517	43.94517	43.94517	43.94517	43.94517	43.94517
313	[illegible]	0	0	0	0	42.809369	42.809369	42.809369	42.809369	42.809369	42.809369	42.809369	42.809369
314	[illegible]	0	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849	38.14849
315	P_DRN	0	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546	31.462546
316	F_HOOD	0	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146	75.981146
317	[illegible]	0	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867	63.725867
318	[illegible]	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603	13.267603
319	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
320	[illegible]	0	0	0	25.349057	25.349057	25.349057	25.349057	25.349057	25.349057	25.349057	25.349057	25.349057
321	[illegible]	0	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367	34.011367
322	HINGE	0	0	0	32.213728	32.213728	32.213728	32.213728	32.213728	32.213728	32.213728	32.213728	32.213728
323	FT_ORD	0	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816	27.148816
324	P_POLK	0	0	0	0	0	43.244976	43.244976	43.244976	43.244976	43.244976	43.244976	43.244976
325	KELLY	0	0	40.581201	40.581201	40.581201	40.581201	40.581201	40.581201	40.581201	40.581201	40.581201	40.581201
326	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
327	[illegible]	0	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089	35.508089
328	[illegible]	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861	71.177861
329	[illegible]	0	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265	73.087265
330	FT_DIX	0	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262	29.642262
331	[illegible]	0	0	37.350976	37.350976	37.350976	37.350976	37.350976	37.350976	37.350976	37.350976	37.350976	37.350976
332	[illegible]	0	0	0	64.296065	64.296065	64.296065	64.296065	64.296065	64.296065	64.296065	64.296065	64.296065
333	[illegible]	0	0	35.472587	35.472587	35.472587	35.472587	35.472587	35.472587	35.472587	35.472587	35.472587	35.472587
334	[illegible]	0	6.0784806	46.357718	46.357718	46.357718	46.357718	46.357718	46.357718	46.357718	46.357718	46.357718	46.357718
335	P_RICK	0	0	0	62.296161	62.296161	62.296161	62.296161	62.296161	62.296161	62.296161	62.296161	62.296161
336	[illegible]	0	0	0	0	30.089306	30.089306	30.089306	30.089306	30.089306	30.089306	30.089306	30.089306
337	FT_LEE	0	0	0	36.980247	36.980247	36.980247	36.980247	36.980247	36.980247	36.980247	36.980247	36.980247
338	[illegible]	0	0	52.098385	52.098385	52.098385	52.098385	52.098385	52.098385	52.098385	52.098385	52.098385	52.098385
339	P_SILL	0	0	0	0	0	0	0	0	0	0	0	0
340	[illegible]	0	0	0	17.864732	46.93178	46.93178	46.93178	46.93178	46.93178	46.93178	46.93178	46.93178
341	[illegible]	0	0	5.278475	5.278475	5.278475	5.278475	5.278475	5.278475	5.278475	5.278475	5.278475	5.278475
342	CORP_C	0	0	8.62344	8.62344	8.62344	8.62344	8.62344	8.62344	8.62344	8.62344	8.62344	8.62344
343	PINE_B	0	0	4.1405744	4.1405744	4.1405744	4.1405744	4.1405744	4.1405744	4.1405744	4.140574	4.1405744	4.1405744
344	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
345	RED_RV	0	7.040539	7.040539	7.040539	7.040539	7.040539	7.040539	7.040539	7.040539	7.040539	[illegible]	7.040539
346	ROCK_I	0	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211	16.226211
347	TOOELE	0	0	5.264569	5.264569	5.264569	5.264569	5.264569	5.264569	5.264569	5.264569	5.264569	5.264569
348	[illegible]	0	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388	2.8928388

Table E-1. Core ECO Spreadsheet - Value View (page 5 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
349	HO_AAP	0	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	4.7847349	7847349
350	LK_AAP	0	0	0	0	0.9921272	0.9921272	0.9921272	0.9921272	0.9921272	0.9921272	0.9921272	0.9921272
351	HD_AAP	0	0	0	0	4.9928049	4.9928049	4.9928049	4.9928049	4.9928049	4.9928049	4.9928049	4.9928049
352	[illegible]	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646	12.320646
353	[illegible]	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626	25.470626
354	[illegible]	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326	48.403326
355	[illegible]	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365	48.690365
356	[illegible]	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487	13.659487
357	W_S_HR	0	0	19.854767	19.854767	19.854767	19.854767	19.854767	19.854767	19.854767	19.854767	19.854767	19.854767
358	[illegible]	0	0	0	5.2280507	5.2280507	5.2280507	5.2280507	5.2280507	5.2280507	5.2280507	5.2280507	5.2280507
359	[illegible]	0	0	0	50.513774	50.513774	50.513774	50.513774	50.513774	50.513774	50.513774	50.513774	50.513774
360	[illegible]	0	0	0	42.960634	42.960634	42.960634	42.960634	42.960634	42.960634	42.960634	42.960634	42.960634
361			sumproduct formulas are used in next row										
362	Total	232.98991	681.62881	1045.531	1383.2235	1491.1841	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291
363	Gd Tot	15875.361											
364	(total annual and grand total energy savings in1000s of MBtu's)												
365													
366													
367													
368	13	Annual Demand Savings											
369		in Kilowatts											
370		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
371	[illegible]	0	0	6172.768	6172.768	6172.768	6172.768	6172.768	6172.768	6172.768	6172.768	6172.768	6172.768
372	[illegible]	0	0	4127.872	4127.872	4127.872	4127.872	4127.872	4127.872	4127.872	4127.872	4127.872	4127.872
373	[illegible]	0	0	0	0	4761.2693	4761.2693	4761.2693	4761.2693	4761.2693	4761.2693	4761.2693	4761.2693
374	[illegible]	0	4465.5147	4465.5147	4465.5147	4465.514	4465.5147	4465.5147	4465.5147	4465.5147	4465.5147	4465.5147	4465.5147
375	P_DRUM	0	3384.0427	3384.0427	3384.0427	3384.04'	3384.0427	3384.0427	3384.0427	3384.0427	3384.0427	3384.0427	3384.0427
376	F_HOOD	0	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224	6104.224
377	[illegible]	0	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173	4974.5173
378	[illegible]	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787	1259.1787
379	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
380	[illegible]	0	0	0	2836.4053	2836.4053	2836.4053	2836.4053	2836.4053	2836.4053	2836.4053	2836.4053	2836.4053
381	[illegible]	0	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027	3079.4027
382	[illegible]	0	0	0	3295.1693	3295.1693	3295.1693	3295.1693	3295.1693	3295.1693	3295.1693	3295.1693	3295.1693
383	[illegible]	0	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893	3866.3893
384	P_POLK	0	0	0	0	0	3362.464	3362.464	3362.464	3362.464	3362.464	3362.464	3362.464
385	RILEY	0	0	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907	3978.0907
386	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
387	[illegible]	0	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8	2760.8
388	[illegible]	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267	5851.6267
389	[illegible]	0	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088	6325.088
390	PT_DIX	0	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288	3088.288
391	[illegible]	0	0	3381.504	3381.504	3381.504	3381.504	3381.504	3381.504	3381.504	3381.504	3381.504	3381.504
392	[illegible]	0	0	0	5610.4533	5610.4533	5610.4533	5610.4533	5610.4533	5610.4533	5610.4533	5610.4533	5610.4533
393	[illegible]	0	0	3187.296	3187.296	3187.296	3187.296	3187.296	3187.296	3187.296	3187.296	3187.296	3187.296
394	[illegible]	0	606.67877	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321	4204.0321
395	P_KNOX	0	0	0	5813.5467	5813.5467	5813.5467	5813.5467	5813.5467	5813.5467	5813.5467	5813.5467	5813.5467
396	[illegible]	0	0	0	0	2939.776	2939.776	2939.776	2939.776	2939.776	2939.776	2939.776	2939.776
397	PT_LEE	0	0	0	3875.712	3875.712	3875.712	3875.712	3875.712	3875.712	3875.712	3875.712	3875.712
398	[illegible]	0	0	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347	4046.6347
399	P_SILL	0	0	0	0	0	0	0	0	0	0	0	0
400	LEN_WD	0	0	0	1742.3224	4879.7547	4879.7547	4879.7547	4879.7547	4879.7547	4879.7547	4879.7547	4879.7547
401	[illegible]	0	0	476	476	476	476	476	476	476	476	476	476
402	COMP_C	0	0	594.048	594.048	594.048	594.048	594.048	594.048	594.048	594.048	594.048	594.048
403	[illegible]	0	0	387.952	387.952	387.952	387.952	387.952	387.952	387.952	387.952	387.952	387.952
404	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
405	RED_RV	0	616.896	616.896	616.896	616.896	616.896	616.896	616.896	616.896	616.896	616.896	616.896
406	ROCK_I	0	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173	1928.1173
407	TOOELE	0	0	595.31733	595.31733	595.31733	595.31733	595.31733	595.31733	595.31733	595.31733	595.31733	595.31733
408	WATERV	0	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533	332.56533
409	HO_AAP	0	460.768	460.768	460.768	460.768	460.768	460.768	460.768	460.768	460.768	460.768	460.768
410	LK_AAP	0	0	0	0	96.469333	96.469333	96.469333	96.469333	96.469333	96.469333	96.469333	96.469333
411	HD_AAP	0	0	0	0	553.42933	553.42933	553.42933	553.42933	553.42933	553.42933	553.42933	553.42933
412	[illegible]	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224	1344.224
413	[illegible]	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987	2744.2987
414	[illegible]	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693	4285.2693
415	[illegible]	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536	5205.536
416	[illegible]	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427	1670.4427
417	W_S_HR	0	0	1740.256	1740.256	1740.256	1740.256	1740.256	1740.256	1740.256	1740.256	1740.256	1740.256
418	[illegible]	0	0	0	559.776	559.776	559.776	559.776	559.776	559.776	559.776	559.776	559.776
419	[illegible]	0	0	0	5027.8293	5027.8293	5027.8293	5027.8293	5027.8293	5027.8293	5027.8293	5027.8293	5027.8293
420	[illegible]	0	0	0	4390.624	4390.624	4390.624	4390.624	4390.624	4390.624	4390.624	4390.624	4390.624
421			sumproduct formulas are used in next row										
422	Total	22380.578	64353.868	96808.96	129260.82	140449.19	143811.66	143811.66	143811.66	143811.66	143811.66	143811.66	143811.66
423	Gd Tot	1459715											
424	(total annual and grand total demand savings in Kilowatts)												
425													
426													
427													
428	14	Annual Cost Savings											
429		in 1000s of dollars											
430		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
431	[illegible]	0	0	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726	1814.3726
432	[illegible]	0	0	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969	1164.1969
433	[illegible]	0	0	0	0	875.96748	875.96748	875.96748	875.96748	875.96748	875.96748	875.96748	875.96748
434	[illegible]	0	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226	1681.0226
435	P_DRM	0	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307	1345.5307

Table E-1. Core ECO Spreadsheet - Value View (page 6 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
436	P_HOOD	0	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965	1799.8965
437	S_HOOD	0	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475	1606.7475
438	[illegible]	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895	766.9895
439	LINES	0	0	0	0	0	0	0	0	0	0	0	0
440	[illegible]	0	0	0	585.44263	585.44263	585.44263	585.44263	585.44263	585.44263	585.44263	585.44263	585.44263
441	[illegible]	0	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416	929.49416
442	[illegible]	0	0	0	743.52392	743.52392	743.52392	743.52392	743.52392	743.52392	743.52392	743.52392	743.52392
443	PT_CHD	0	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194	1416.7194
444	P_[illegible]	0	0	0	0	0	532.49909	532.49909	532.49909	532.49909	532.49909	532.49909	532.49909
445	[illegible]	0	0	967.93346	967.93346	967.93346	967.93346	967.93346	967.93346	967.93346	967.93346	967.93346	967.93346
446	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
447	[illegible]	0	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361	896.97361
448	[illegible]	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431	2838.1431
449	[illegible]	0	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197	2365.0197
450	PT_DIX	0	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098	1454.9098
451	[illegible]	0	0	815.96844	815.96844	815.96844	815.96844	815.96844	815.96844	815.96844	815.96844	815.96844	815.96844
452	[illegible]	0	0	0	1086.8651	1086.8651	1086.8651	1086.8651	1086.8651	1086.8651	1086.8651	1086.8651	1086.8651
453	[illegible]	0	0	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941	1026.6941
454	[illegible]	0	189.33204	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968	1311.9968
455	P_JACK	0	0	0	1370.6305	1370.6305	1370.6305	1370.6305	1370.6305	1370.6305	1370.6305	1370.6305	1370.6305
456	[illegible]	0	0	0	0	530.93545	530.93545	530.93545	530.93545	530.93545	530.93545	530.93545	530.93545
457	PT_LEE	0	0	0	815.10896	815.10896	815.10896	815.10896	815.10896	815.10896	815.10896	815.10896	815.10896
458	[illegible]	0	0	884.79304	884.79304	884.79304	884.79304	884.79304	884.79304	884.79304	884.79304	884.79304	884.79304
459	P_SILL	0	0	0	0	0	0	0	0	0	0	0	0
460	LEN_HD	0	0	0	428.99058	1119.731	1119.731	1119.731	1119.731	1119.731	1119.731	1119.731	1119.731
461	[illegible]	0	0	132.01832	132.01832	132.01832	132.01832	132.01832	132.01832	132.01832	132.01832	132.01832	132.01832
462	COMP_C		0	161.432	161.432	161.432	161.432	161.432	161.432	161.432	161.432	161.432	161.432
463	[illegible]	J	0	81.463238	81.463238	81.463238	81.463238	81.463238	81.463238	81.463238	81.463238	81.463238	81.463238
464	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
465	RED_RV	0	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366	177.39366
466	ROCK_I	0	758.5258	758.5258	758.5258	758.5258	758.5258	758.5258	758.5258	758.5258	758. .258	758.5258	758.5258
467	[illegible]	0	0	169.73872	169.73872	169.73872	169.73872	169.73872	169.73872	169.73872	169.73872	169.73872	169.73872
468	[illegible]	0	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436	134.44436
469	HO_AAP	0	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892	140.93892
470	LK_AAP	0	0	0	0	19.098743	19.098743	19.098743	19.098743	19.098743	19.098743	19.098743	19.098743
471	RD_AAP	0	0	0	0	92.046792	92.046792	92.046792	92.046792	92.046792	92.046792	92.046792	92.046792
472	[illegible]	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294	1012.8294
473	[illegible]	2013.6279	2013.6279	2013.6279	2013.6279	2013.6279	201[illegible]	2013.6279	2013.6279	2013.6279	2013.6279	2013.6279	2013.6279
474	[illegible]	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315	1819.9315
475	[illegible]	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132	2855.3132
476	[illegible]	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531	1156.3531
477	W_S_HR	0	0	475.22648	475.22648	475.22648	475.22648	475.22648	475.22648	475.22648	475.22648	475.22648	475.22648
478	[illegible]	0	0	0	121.30002	121.30002	121.30002	121.30002	121.30002	121.30002	121.30002	121.30002	121.30002
479	N_[illegible]	0	0	0	1146.84	1146.84	1146.84	1146.84	1146.84	1146.84	1146.84	1146.84	1146.84
480	[illegible]	0	0	0	989.18107	989.18107	989.18107	989.18107	989.18107	989.18107	989.18107	989.18107	989.18107
481				sumproduct formulas are used in next row									
482	Total	12263.186	27164.136	35980.639	43265.521	45477.308	46009.807	46009.807	46009.807	46009.807	46009.807	46009.807	46009.807
483	Gd Tot	486219.44											
484	(total annual and grand total cost savings in1000s of dollars)												
485													
486													
487													
488	15	Annual Environmental Savings											
489		in short tons											
490		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
491	[illegible]	0	0	17454.434	17454.434	17454.434	17454.434	17454.434	17454.434	17454.434	17454.434	17454.434	17454.434
492	[illegible]	0	0	16402.182	16402.182	16402.182	16402.182	16402.182	16402.182	16402.182	16402.182	16402.182	16402.182
493	[illegible]	0	0	0	0	17258.087	17258.087	17258.087	17258.087	17258.087	17258.087	17258.087	17258.087
494	[illegible]	0	114[illegible]	11458.645	11458.645	11458.645	11458.645	11458.645	11458.645	11458.645	11458.645	11458.645	11458.645
495	P_[illegible]	0	[illegible]	5590.929	5590.929	5590.929	5590.929	5590.929	5590.929	5590.929	5590.929	5590.929	5590.929
496	P_HOOD	0	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88	19429.88
497	S_HOOD	0	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814	16144.814
498	[illegible]	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346	1249.0346
499	LINES	0	0	0	0	0	0	0	0	0	0	0	0
500	[illegible]	0	0	0	7274.3944	7274.3944	7274.3944	7274.3944	7274.3944	7274.3944	7274.3944	7274.3944	7274.3944
501	[illegible]	0	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995	8350.4995
502	[illegible]	0	0	0	8438.5132	8438.5132	8438.5132	8438.5132	8438.5132	8438.5132	8438.5132	8438.5132	8438.5132
503	PT_CHD	0	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309	2407.4309
504	P_[illegible]	0	0	0	0	0	9588.9636	9588.9636	9588.9636	9588.9636	9588.9636	9588.9636	9588.9636
505	[illegible]	0	0	11466.612	11466.612	11466.612	11466.612	11466.612	11466.612	11466.612	11466.612	11466.612	11466.612
506	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
507	[illegible]	0	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441	8190.0441
508	[illegible]	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239	16927.239
509	[illegible]	0	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733	19079.733
510	PT_DIX	0	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937	2580.6937
511	[illegible]	0	0	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085	7062.7085
512	[illegible]	0	0	0	15428.732	15428.732	15428.732	15428.732	15428.732	15428.732	15428.732	15428.732	15428.732
513	[illegible]	0	0	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932	6852.9932
514	[illegible]	0	820.63331	5686.667	5686.667	5686.667	5686.667	5686.667	5686.667	5686.667	5686.667	5686.667	5686.667
515	P_JACK	)	0	0	23259.913	23259.913	23259.913	23259.913	23259.913	23259.913	23259.913	23259.913	23259.913
516	[illegible]	0	0	0	0	8453.1608	8453.1608	8453.1608	8453.1608	8453.1608	8453.1608	8453.160[illegible]	8453.1608
517	PT_LEE	0	0	0	7080.4926	7080.4926	7080.4926	7080.4926	7080.4926	7080.4926	7080.4926	7080.49[illegible]	[illegible]80.4926
518	[illegible]	0	0	12801.218	12801.218	12801.218	12801.218	12801.218	12801.218	12801.218	12801.218	12801.218	[illegible]801.218
519	P_SILL	0	0	0	0	0	0	0	0	0	0	0	0
520	LEN_HD	0	0	0	5802.1666	15487.764	15487.764	15487.764	15487.764	15487.764	15487.764	15487.764	15487.764
521	[illegible]	0	0	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573	1326.4573
522	COMP_C	0	0	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699	2124.3699

Table E-1. Core ECO Spreadsheet - Value View
(page 7 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
123	[illegible]	0	0	891.7416	891.7416	891.7416	891.7416	891.7416	891.7416	891.7416	891.7416	891.7416	891.7416
124	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
125	[illegible]	0	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741	1827.7741
126	ROCK_I	0	2650.3853	2650.3853	[illegible]	2650.3853	2650.3853	2650.3853	2650.3853	2650.3853	2650.3853	2650.3853	2850.3853
127	TOOELE	0	0	2158.9104	2158.1104	2158.9104	2158.9104	2158.9104	2158.9104	2158.9104	2158.9104	2158.9104	2158.9104
128	[illegible]	0	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031	514.08031
129	HO_AAP	0	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411	1208.411
130	LK_AAP	0	0	0	0	330.08808	330.08808	330.08808	330.08808	330.08808	330.08808	330.08808	330.08808
131	[illegible]	0	0	[illegible]	[illegible]	939.89469	939.89469	939.89469	939.89469	939.89469	939.89469	939.89469	939.89469
132	[illegible]	3937.3561	3937.3561	3937.3561	[illegible]	3937.3561	3937.3561	3937.3561	3937.3561	3937.3561	3937.3561	3937.3561	3937.3561
133	[illegible]	2217.3204	2217.3204	2217.3204	[illegible]	2217.3204	2217.3204	2217.3204	2217.3204	2217.3204	2217.3204	2217.3204	2217.3204
134	[illegible]	12354.666	12354.666	12354.666	[illegible]	12354.466	12354.666	12354.666	12354.366	12354.666	12354.666	12354.666	12354.666
135	[illegible]	13187.422	13187.422	13187.422	[illegible]	13187.422	13187.422	13187.422	13187.422	13187.422	13187.422	13187.422	13187.422
136	[illegible]	1225.8653	1225.8653	1225.8653	[illegible]	1225.8653	1225.8653	1225.8653	1225.8653	1225.8653	1225.8653	1225.8653	1225.8653
137	[illegible]	0	0	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157	7161.8157
138	[illegible]	0	0	0	1411.4719	1411.4719	1411.4719	1411.4719	1411.4719	1411.4719	1411.4719	1411.4719	1411.4719
139	[illegible]	0	0	0	13213.383	13213.383	13213.383	13213.383	13213.383	13213.383	13213.383	13213.383	13213.383
140	[illegible]	0	0	0	8206.0126	8206.0126	8206.0126	8206.0126	8206.0126	8206.0126	8206.0126	8206.0126	8206.0126
141			sumproduct formulas are used in next row.										
142	Total	81098.904	151350.06	241919.83	332124.61	368701.44	378290.4	378290.4	378290.4	378290.4	378290.4	378290.4	378290.4
143	Gd Tot	3793227.4											
144	(total annual and grand total environmental savings in short tons)												

	A	B	C	D
145				
146				
147				
148				
149				
150				
151				
152			P2	P3
153				
154				
155		Postprocessor		
156		Data and Formulas below are not sent to the optimizer		
157		Data:	Logic:	Logic:
158	P1	Quantity	Percent	Quantity
159		Fixtures/	fy93	fy93
160		Opportuni	Penetrat	Penetration
161	[illegible]	58735	15	8810.25
162	[illegible]	37940	15	5691
163	[illegible]	43761.667	15	6564.25
164	[illegible]	41043.333	15	6156.5
165	[illegible]	31103.333	15	4665.5
166	[illegible]	56105	15	8415.75
167	[illegible]	45721.667	15	6858.25
168	[illegible]	11573.333	15	1736
169	[illegible]	0	100	0
170	[illegible]	24231.667	15	3634.75
171	[illegible]	28303.333	15	4245.5
172	[illegible]	30286.667	15	4543
173	FT_ORD	35536.667	15	5330.5
174	F_POLK	30905	15	4635.75
175	RILEY	36563.333	15	5484.5
176	[illegible]	0	100	0
177	[illegible]	25375	15	3806.25
178	[illegible]	53783.333	15	8067.5
179	[illegible]	58135	15	8720.25
180	FT_DIX	28385	15	4257.75
181	[illegible]	31080	15	4662
182	[illegible]	51566.667	15	7735
183	[illegible]	29295	15	4394.25
184	[illegible]	38640	15	5796
185	F_KNOX	53433.333	15	8015
186	[illegible]	27020	15	4053
187	FT_LEE	32865	15	4929.75
188	[illegible]	37193.333	15	5579
189	F_SILL	0	100	0
190	[illegible]	42093.333	15	6314
191	[illegible]	4375	15	656.25
192	CORP_C	5460	15	819
193	[illegible]	3290	15	493.5
194	[illegible]	0	100	0
195	[illegible]	5670	15	850.5
196	ROCK_I	17721.667	15	2658.25
197	TOOELE	5471.6667	15	820.75
198	[illegible]	3056.6667	15	458.5
199	HO_AAP	4235	15	635.25
200	LK_AAP	886.66667	15	133
201	[illegible]	5066.6667	15	763
202	[illegible]	12355	15	1853.25
203	[illegible]	25223.333	15	3783.5
204	[illegible]	39386.667	15	5908
205	[illegible]	47845	15	7176.75
206	[illegible]	15353.333	15	2303
207	[illegible]	15995	15	2399.25
208	[illegible]	5145	15	771.75
209	[illegible]	46211.667	15	6931.75

Table E-1. Core ECO Spreadsheet - Value View (page 8 of 8 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
610	[illegible]	40358	18	6083.25									
611													
612													
613													
614													
615													
616													
617													
618	P4												
619		Cumulative quantity penetration above the fy93 penetration											
620		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
621	[illegible]	0	0	48224.75	48224.75	48224.75	48224.75	48224.75	48224.75	48224.75	48224.75	48224.75	48224.75
622	[illegible]	0	0	32249	32249	32249	32249	32249	32249	32249	32249	32249	32249
623	[illegible]	0	0	0	0	37197.417	37197.417	37197.417	37197.417	37197.417	37197.417	37197.417	37197.417
624	[illegible]	0	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833	34886.833
625	[illegible]	0	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833	26437.833
626	[illegible]	0	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25
627	[illegible]	0	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417	38863.417
628	[illegible]	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333
629	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
630	[illegible]	0	0	0	20896.917	20896.917	20896.917	20896.917	20896.917	20896.917	20896.917	20896.917	20896.917
631	[illegible]	0	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833	24087.833
632	[illegible]	0	0	0	25743.667	25743.667	25743.667	25743.667	25743.667	25743.667	25743.667	25743.667	25743.667
633	[illegible]	0	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167
634	[illegible]	0	0	0	0	0	26269.25	26269.25	26269.25	26269.25	26269.25	26269.25	26269.25
635	[illegible]	0	0	31078.833	31078.833	31078.833	31078.833	31078.833	31078.833	31078.833	31078.833	31078.833	31078.833
636	[illegible]	0	0	0		0	0	0	0	0	0	0	0
637	[illegible]	0	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75
638	[illegible]	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833
639	[illegible]	0	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75	49414.75
640	[illegible]	0	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25
641	[illegible]	0	0	26418	26418	26418	26418	26418	26418	26418	26418	26418	26418
642	[illegible]	0	0	0	43831.667	43831.667	43831.667	43831.667	43831.667	43831.667	43831.667	43831.667	43831.667
643	[illegible]	0	0	24900.75	24900.75	24900.75	24900.75	24900.75	24900.75	24900.75	24900.75	24900.75	24900.75
644	[illegible]	0	4739.6623	32844.001	32844.001	32844.001	32844.001	32844.001	32844.001	32844.001	32844.001	32844.001	32844.001
645	[illegible]	0	0	0	45418.333	45418.333	45418.333	45418.333	45418.333	45418.333	45418.333	45418.333	45418.333
646	[illegible]	0	0	0	0	22967	22967	22967	22967	22967	22967	22967	22967
647	[illegible]	0	0	0	27935.25	27935.25	27935.25	27935.25	27935.25	27935.25	27935.25	27935.25	27935.25
648	[illegible]	0	0	31614.333	31614.333	31614.333	31614.333	31614.333	31614.333	31614.333	31614.333	31614.333	31614.333
649	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
650	[illegible]	0	0	0	13611.894	35779.333	35779.333	35779.333	35779.333	35779.333	35779.333	35779.333	35779.333
651	[illegible]	0	0	3718.75	3718.75	3718.75	3718.75	3718.75	3718.75	3718.75	3718.75	3718.75	3718.75
652	CORP_C	0	0	4641	4641	4641	4641	4641	4641	4641	4641	4641	4641
653	[illegible]	0	0	2798.5	2798.5	2798.5	2798.5	2798.5	2798.5	2798.5	2798.5	2798.5	2798.5
654	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
655	RED_RV	0	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5
656	ROCK_I	0	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417
657	TOOELE	0	0	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167	4650.9167
658	[illegible]	0	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667
659	HD_AAP	0	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75
660	[illegible]	0	0	0	0	753.66667	753.66667	753.66667	753.66667	753.66667	753.66667	753.66667	753.66667
661	RD_AAP	0	0	0	0	4323.6667	4323.6667	4323.6667	4323.6667	4323.6667	4323.6667	4323.6667	4323.6667
662	[illegible]	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75
663	[illegible]	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833
664	[illegible]	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667
665	[illegible]	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25	40668.25
666	[illegible]	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333
667	[illegible]	0	0	13598.75	13598.75	13598.75	13598.75	13598.75	13598.75	13598.75	13598.75	13598.75	13598.75
668	[illegible]	0	0	0	4373.25	4373.25	4373.25	4373.25	4373.25	4373.25	4373.25	4373.25	4373.25
669	[illegible]	0	0	0	39279.917	39279.917	39279.917	39279.917	39279.917	39279.917	39279.917	39279.917	39279.917
670	[illegible]	0	0	0	34301.75	34301.75	34301.75	34301.75	34301.75	34301.75	34301.75	34301.75	34301.75
671													
672													
673		Quantity											
674		fy93											
675		Penetration											
676	P5	by ECO											
677		198269.75											
678													
679		Cumulative quantity penetration by ECO above the fy93 penetration											
680	P6	174692	502764.58	754797.5	1009850.1	1097259.3	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6
681													
682													
683		Cumulative quantity penetration by ECO											
684	P7	fy94	fy95	fy96	fy97	fy98	fy99						
685		372961.75	701034.33	953027.25	1208119.9	1295529.1	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3
686													
687	end												

Table E-2. Core ECO Spreadsheet - Formula View (page 1 of 8 pages)

	A	B	C	D	H
1		2X4FL	2x4 Fluorescent Lighting Retrofit		REC
2		Data except column H			
3		Col B: Costs in 1000s of dollars			
4		Col C: Energy savings in 1000s of MBtu's			
5		Col D: Demand savings in Kilowatts			
6		See below for Cost Savings			
7		Col F: Environmental Savings in Tons			
8			Annual	Annual	Investment
9	6 Char	Init_Cost	Energy_Sv	Demand_Sv	%_Limit
10	Site Co	1%_Invest	1%_Invest	1%_Invest	Logic
11	[illegible]	0	0	0	=G11-M191
12	[illegible]	0	0	0	=G12-M192
13	[illegible]	0	0	0	=G13-M193
14	[illegible]	0	0	0	=G14-M194
15	[illegible]	0	0	0	=G15-M195
16	[illegible]	0	0	0	=G16-M196
17	[illegible]	0	0	0	=G17-M197
18	[illegible]	0	0	0	=G18-M198
19	[illegible]	0	0	0	=G19-M199
20	[illegible]	0	0	0	=G20-M200
21	[illegible]	0	0	0	=G21-M201
22	[illegible]	0	0	0	=G22-M202
23	[illegible]	0	0	0	=G23-M203
24	[illegible]	0	0	0	=G24-M204
25	[illegible]	0	0	0	=G25-M205
26	[illegible]	0	0	0	=G26-M206
27	[illegible]	0	0	0	=G27-M207
28	[illegible]	0	0	0	=G28-M208
29	[illegible]	0	0	0	=G29-M209
30	[illegible]	0	0	0	=G30-M210
31	[illegible]	0	0	0	=G31-M211
32	[illegible]	0	0	0	=G32-M212
33	[illegible]	0	0	0	=G33-M213
34	[illegible]	0	0	0	=G34-M214
35	[illegible]	0	0	0	=G35-M215
36	[illegible]	0	0	0	=G36-M216
37	[illegible]	0	0	0	=G37-M217
38	[illegible]	0	0	0	=G38-M218
39	[illegible]	0	0	0	=G39-M219
40	[illegible]	0	0	0	=G40-M220
41	[illegible]	0	0	0	=G41-M221
42	[illegible]	0	0	0	=G42-M222
43	[illegible]	0	0	0	=G43-M223
44	[illegible]	0	0	0	=G44-M224
45	[illegible]	0	0	0	=G45-M225
46	[illegible]	0	0	0	=G46-M226
47	[illegible]	0	0	0	=G47-M227
48	[illegible]	0	0	0	=G48-M228
49	HD_AAP	0	0	0	=G49-M229
50	LK_AAP	0	0	0	=G50-M230
51	[illegible]	0	0	0	=G51-M231
52	[illegible]	0	0	0	=G52-M232
53	[illegible]	0	0	0	=G53-M233
54	[illegible]	0	0	0	=G54-M234
55	[illegible]	0	0	0	=G55-M235
56	[illegible]	0	0	0	=G56-M236
57	[illegible]	0	0	0	=G57-M237
58	[illegible]	0	0	0	=G58-M238
59	[illegible]	0	0	0	=G59-M239
60	[illegible]	0	0	0	=G60-M240
61		The next row contains formulas that are nc			
62	sum	=SUM(B11:B60)	=SUM(C11:C60)	=SUM(D11:D60)	
63					
64					
65		Data			
66		Annual Cost Savings (1% investment)			
67		in 1000s of dollars			
68		(CERL 100% data divided by 1000*100			
69		with annual adjustments for energy prices			
70		fy94	fy95	fy96	fy00
71	[illegible]	0	0	0	0
72	[illegible]	0	0	0	0
73	[illegible]	0	0	0	0
74	[illegible]	0	0	0	0
75	[illegible]	0	0	0	0
76	[illegible]	0	0	0	0
77	[illegible]	0	0	0	0
78	[illegible]	0	0	0	0
79	[illegible]	0	0	0	0
80	[illegible]	0	0	0	0
81	[illegible]	0	0	0	0
82	[illegible]	0	0	0	0
83	[illegible]	0	0	0	0
84	[illegible]	0	0	0	0
85	[illegible]	0	0	0	0
86	[illegible]	0	0	0	0
87	[illegible]	0	0	0	0

Table E-2. Core ECO Spreadsheet - Formula View (page 2 of 8 pages)

	A	B	C	D	H
88	[illegible]	0	0	0	0
89	[illegible]	0	0	0	0
90	PT_DEX	0	0	0	0
91	[illegible]	0	0	0	0
92	[illegible]	0	0	0	0
93	[illegible]	0	0	0	0
94	[illegible]	0	0	0	0
95	F_JACK	0	0	0	0
96	[illegible]	0	0	0	0
97	PT_LIB	0	0	0	0
98	[illegible]	0	0	0	0
99	F_KILL	0	0	0	0
100	[illegible]	0	0	0	0
101	[illegible]	0	0	0	0
102	COMP_C	0	0	0	0
103	[illegible]	0	0	0	0
104	[illegible]	0	0	0	0
105	RED_JW	0	0	0	0
106	ROCK_I	0	0	0	0
107	[illegible]	0	0	0	0
108	[illegible]	0	0	0	0
109	HD_AAP	0	0	0	0
110	LR_AAP	0	0	0	0
111	SD_AAP	0	0	0	0
112	[illegible]	0	0	0	0
113	[illegible]	0	0	0	0
114	[illegible]	0	0	0	0
115	[illegible]	0	0	0	0
116	[illegible]	0	0	0	0
117	[illegible]	0	0	0	0
118	[illegible]	0	0	0	0
119	[illegible]	0	0	0	0
120	[illegible]	0	0	0	0
121		The next row contains formulas that are nc			
122	sum	=SUM(B71:B120)	=SUM(C71:C120)	=SUM(D71:D120)	=SUM(H71:H120)
123					
124					
125					
126					
127					
128		Decision cells - Percent investment			
129					
130		fy94	fy95	fy96	fy00
131	[illegible]	0	0	0	0
132	[illegible]	0	0	0	0
133	[illegible]	0	0	0	0
134	[illegible]	0	0	0	0
135	F_DRUM	0	0	0	0
136	[illegible]	0	0	0	0
137	[illegible]	0	0	0	0
138	[illegible]	0	0	0	0
139	[illegible]	0	0	0	0
140	[illegible]	0	0	0	0
141	[illegible]	0	0	0	0
142	[illegible]	0	0	0	0
143	[illegible]	0	0	0	0
144	[illegible]	0	0	0	0
145	[illegible]	0	0	0	0
146	[illegible]	0	0	0	0
147	[illegible]	0	0	0	0
148	[illegible]	0	0	0	0
149	[illegible]	0	0	0	0
150	PT_DEX	0	0	0	0
151	[illegible]	0	0	0	0
152	[illegible]	0	0	0	0
153	[illegible]	0	0	0	0
154	[illegible]	0	0	0	0
155	F_JACK	0	0	0	0
156	[illegible]	0	0	0	0
157	PT_LIB	0	0	0	0
158	[illegible]	0	0	0	0
159	F_KILL	0	0	0	0
160	[illegible]	0	0	0	0
161	[illegible]	0	0	0	0
162	COMP_C	0	0	0	0
163	[illegible]	0	0	0	0
164	[illegible]	0	0	0	0
165	RED_JW	0	0	0	0
166	ROCK_I	0	0	0	0
167	[illegible]	0	0	0	0
168	[illegible]	0	0	0	0
169	HD_AAP	0	0	0	0
170	LR_AAP	0	0	0	0
171	SD_AAP	0	0	0	0
172	[illegible]	0	0	0	0
173	[illegible]	0	0	0	0
174	[illegible]	0	0	0	0

Table E-2. Core ECO Spreadsheet - Formula View
(page 3 of 8 pages)

	A	B	C	D	H
175	[illegible]	0	0	0	0
176	[illegible]	0	0	0	0
177	[illegible]	0	0	0	0
178	[illegible]	0	0	0	0
179	[illegible]	0	0	0	0
180	[illegible]	0	0	0	0
181					
182					
183					
184					
185					
186					
187					
188		Cumulative % investment above the			
189					
190		fy94	fy95	fy96	fy00
191	[illegible]	=B131	=B191+C131	=C191+D131	=G191+H131
192	[illegible]	=B132	=B192+C132	=C192+D132	=G192+H132
193	[illegible]	=B133	=B193+C133	=C133+D133	=G193+H133
194	[illegible]	=B134	=B194+C134	=C194+D134	=G194+H134
195	[illegible]	=B135	=B195+C135	=C195+D135	=G195+H135
196	[illegible]	=B136	=B196+C136	=C196+D136	=G196+H136
197	[illegible]	=B137	=B197+C137	=C197+D137	=G197+H137
198	[illegible]	=B138	=B198+C138	=C198+D138	=G198+H138
199	[illegible]	=B139	=B199+C139	=C199+D139	=G199+H139
200	[illegible]	=B140	=B200+C140	=C200+D140	=G200+H140
201	[illegible]	=B141	=B201+C141	=C201+D141	=G201+H141
202	[illegible]	=B142	=B202+C142	=C202+D142	=G202+H142
203	[illegible]	=B143	=B203+C143	=C203+D143	=G203+H143
204	[illegible]	=B144	=B204+C144	=C204+D144	=G204+H144
205	[illegible]	=B145	=B205+C145	=C205+D145	=G205+H145
206	[illegible]	=B144	=B206+C144	=C206+D146	=G206+H146
207	[illegible]	=B147	=B207+C147	=C207+D147	=G207+H147
208	[illegible]	=B148	=B208+C148	=C208+D148	=G208+H148
209	[illegible]	=B149	=B209+C149	=C209+D149	=G209+H149
210	[illegible]	=B150	=B210+C150	=C210+D150	=G210+H150
211	[illegible]	=B151	=B211+C151	=C211+D151	=G211+H151
212	[illegible]	=B152	=B212+C152	=C212+D152	=G212+H152
213	[illegible]	=B153	=B213+C153	=C213+D153	=G213+H153
214	[illegible]	=B154	=B214+C154	=C214+D154	=G214+H154
215	[illegible]	=B155	=B215+C155	=C215+D155	=G215+H155
216	[illegible]	=B156	=B216+C156	=C216+D156	=G216+H156
217	[illegible]	=B157	=B217+C157	=C217+D157	=G217+H157
218	[illegible]	=B158	=B218+C158	=C218+D158	=G218+H158
219	[illegible]	=B159	=B219+C159	=C219+D159	=G219+H159
220	[illegible]	=B160	=B220+C160	=C220+D160	=G220+H160
221	[illegible]	=B161	=B221+C161	=C221+D161	=G221+H161
222	[illegible]	=B162	=B222+C162	=C222+D162	=G222+H162
223	[illegible]	=B163	=B223+C163	=C223+D163	=G223+H163
224	[illegible]	=B164	=B224+C164	=C224+D164	=G224+H164
225	[illegible]	=B165	=B225+C165	=C225+D165	=G225+H165
226	[illegible]	=B166	=B226+C166	=C226+D166	=G226+H166
227	[illegible]	=B167	=B227+C167	=C227+D167	=G227+H167
228	[illegible]	=B168	=B228+C168	=C228+D168	=G228+H168
229	[illegible]	=B169	=B229+C169	=C229+D169	=G229+H169
230	[illegible]	=B170	=B230+C170	=C230+D170	=G230+H170
231	[illegible]	=B171	=B231+C171	=C231+D171	=G231+H171
232	[illegible]	=B172	=B232+C172	=C232+D172	=G232+H172
233	[illegible]	=B173	=B233+C173	=C233+D173	=G233+H173
234	[illegible]	=B174	=B234+C174	=C234+D174	=G234+H174
235	[illegible]	=B175	=B235+C175	=C235+D175	=G235+H175
236	[illegible]	=B176	=B236+C176	=C236+D176	=G236+H176
237	[illegible]	=B177	=B237+C177	=C237+D177	=G237+H177
238	[illegible]	=B178	=B238+C178	=C238+D178	=G238+H178
239	[illegible]	=B179	=B239+C179	=C239+D179	=G239+H179
240	[illegible]	=B180	=B240+C180	=C240+D180	=G240+H180
241					
242					
243					
244					
245					
246					
247					
248		Annual implementation costs			
249		in 1000s of dollars			
250		fy94	fy95	fy96	fy00
251	[illegible]	=$B11*B131	=$B11*C131	=$B11*D131	=$B11*H131
252	[illegible]	=$B12*B132	=$B12*C132	=$B12*D132	=$B12*H132
253	[illegible]	=$B13*B133	=$B13*C133	=$B13*D133	=$B13*H133
254	[illegible]	=$B14*B134	=$B14*C134	=$B14*D134	=$B14*H134
255	[illegible]	=$B15*B135	=$B15*C135	=$B15*D135	=$B15*H135
256	[illegible]	=$B16*B136	=$B16*C136	=$B16*D136	=$B16*H136
257	[illegible]	=$B17*B137	=$B17*C137	=$B17*D137	=$B17*H137
258	[illegible]	=$B18*B138	=$B18*C138	=$B18*D138	=$B18*H138
259	[illegible]	=$B19*B139	=$B19*C139	=$B19*D139	=$B19*H139
260	[illegible]	=$B20*B140	=$B20*C140	=$B20*D140	=$B20*H140
261	[illegible]	=$B21*B141	=$B21*C141	=$B21*D141	=$B21*H141

Table E-2. Core ECO Spreadsheet - Formula View (page 4 of 8 pages)

	A	B	C	D	H
262	MEADE	=$B22*B142	=$B22*C142	=$B22*D142	=$B22*H142
263	FT_ORD	=$B23*B143	=$B23*C143	=$B23*D143	=$B23*H143
264	F_POLK	=$B24*B144	=$B24*C144	=$B24*D144	=$B24*H144
265	RILEY	=$B25*B145	=$B25*C145	=$B25*D145	=$B25*H145
266	WAINWR	=$B26*B146	=$B26*C146	=$B26*D146	=$B26*H146
267	STEWART_	=$B27*B147	=$B27*C147	=$B27*D147	=$B27*H147
268	BENNING	=$B28*B148	=$B28*C148	=$B28*D148	=$B28*H148
269	BLISS	=$B29*B149	=$B29*C149	=$B29*D149	=$B29*H149
270	FT_DIX	=$B30*B150	=$B30*C150	=$B30*D150	=$B30*H150
271	[illegible]	=$B31*B151	=$B31*C151	=$B31*D151	=$B31*H151
272	GORDON	=$B32*B152	=$B32*C152	=$B32*D152	=$B32*H152
273	[illegible]	=$B33*B153	=$B33*C153	=$B33*D153	=$B33*H153
274	JACKSN	=$B34*B154	=$B34*C154	=$B34*D154	=$B34*H154
275	F_KNOX	=$B35*B155	=$B35*C155	=$B35*D155	=$B35*H155
276	[illegible]	=$B36*B156	=$B36*C156	=$B36*D156	=$B36*H156
277	FT_LEE	=$B37*B157	=$B37*C157	=$B37*D157	=$B37*H157
278	RUCKER	=$B38*B158	=$B38*C158	=$B38*D158	=$B38*H158
279	F_SILL	=$B39*B159	=$B39*C159	=$B39*D159	=$B39*H159
280	LEN_WO_	=$B40*B160	=$B40*C160	=$B40*D160	=$B40*H160
281	[illegible]	=$B41*B161	=$B41*C161	=$B41*D161	=$B41*H161
282	COMP_C	=$B42*B162	=$B42*C162	=$B42*D162	=$B42*H162
283	[illegible]	=$B43*B163	=$B43*C163	=$B43*D163	=$B43*H163
284	PUEBLO	=$B44*B164	=$B44*C164	=$B44*D164	=$B44*H164
285	RED_RV	=$B45*B165	=$B45*C165	=$B45*D165	=$B45*H165
286	ROCK_I	=$B46*B166	=$B46*C166	=$B46*D166	=$B46*H*66
287	TOOELE	=$B47*B167	=$B47*C167	=$B47*D167	=$B47*H !67
288	[illegible]	=$B48*B168	=$B48*C168	=$B48*D168	=$B48* 168
289	HQ_AAP	=$B49*B169	=$B49*C169	=$B49*D169	=$B49*H169
290	LK_AAP	=$B50*B170	=$B50*C170	=$B50*D170	=$B50*H170
291	MD_AAP_	=$B51*B171	=$B51*C171	=$B51*D171	=$B51*H171
292	[illegible]	=$B52*B172	=$B52*C172	=$B52*D172	=$B52*H172
293	[illegible]	=$B53*B173	=$B53*C173	=$B53*D173	=$B53*H173
294	[illegible]	=$B54*B174	=$B54*C174	=$B54*D174	=$B54*H174
295	[illegible]	=$B55*B175	=$B55*C175	=$B55*D175	=$B55*H175
296	PICTNY	=$B56*B176	=$B56*C176	=$B56*D176	=$B56*H176
297	W_S_MR_	=$B57*B177	=$B57*C177	=$B57*D177	=$B57*H177
298	[illegible]	=$B58*B178	=$B58*C178	=$B58*D178	=$B58*H178
299	[illegible]	=$B59*B179	=$B59*C179	=$B59*D179	=$B59*H179
300	[illegible]	=$B60*B180	=$B60*C180	=$B60*D180	=$B60*H180
301			sumproduct formulas are used in ne		
302	Tot_An_	=SUMPRODUCT($B11:$B60,B131:B180)	=SUMPRODUCT($B11:$B60,C131:C180)	=SUMPRODUCT($B11:$B60,D131:D180)	=SUMPRODUCT($B11:$B60,H131:H180)
303	(total an				
304			(The optimizer uses the only sumproduct		
305			the site-by-site components above the su		
306					
307					
308		Annual Energy Savings			
309		in 1000s of MBtu			
310		fy94	fy95	fy96	fy00
311	BRAGG	=$C11*B191	=$C11*C191	=$C11*D191	=$C11*H191
312	CAMPBE	=$C12*B192	=$C12*C192	=$C12*D192	=$C12*H192
313	CARSON	=$C13*B193	=$C13*C193	=$C13*D193	=$C13*H193
314	DEVENS	=$C14*B194	=$C14*C194	=$C14*D194	=$C14*H194
315	F_DRUM	=$C15*B195	=$C15*C195	=$C15*D195	=$C15*H195
316	F_HOOD	=$C16*B196	=$C16*C196	=$C16*D196	=$C16*H196
317	S_HOUS	=$C17*B197	=$C17*C197	=$C17*D197	=$C17*H197
318	IRWIN	=$C18*B198	=$C18*C198	=$C18*D198	=$C18*H198
319	LEWIS	=$C19*B199	=$C19*C199	=$C19*D199	=$C19*H199
320	McCOY	=$C20*B200	=$C20*C200	=$C20*D200	=$C20*H200
321	McPHER	=$C21*B201	=$C21*C201	=$C21*D201	=$C21*H201
322	MEADE	=$C22*B202	=$C22*C202	=$C22*D202	=$C22*H202
323	FT_ORD	=$C23*B203	=$C23*C203	=$C23*D203	=$C23*H203
324	F_POLK	=$C24*B204	=$C24*C204	=$C24*D204	=$C24*H204
325	RILEY	=$C25*B205	=$C25*C205	=$C25*D205	=$C25*H205
326	WAINWR	=$C26*B206	=$C26*C206	=$C26*D206	=$C26*H206
327	STEWART_	=$C27*B207	=$C27*C207	=$C27*D207	=$C27*H207
328	BENNING	=$C28*B208	=$C28*C208	=$C28*D208	=$C28*H208
329	BLISS	=$C29*B209	=$C29*C209	=$C29*D209	=$C29*H209
330	FT_DIX	=$C30*B210	=$C30*C210	=$C30*D210	=$C30*H210
331	[illegible]	=$C31*B211	=$C31*C211	-$C31*D211	=$C31*H211
332	GORDON	=$C32*B212	=$C32*C212	=$C32*D212	=$C32*H212
333	[illegible]	=$C33*B213	=[illegible]3*C213	=$C33*D213	=$C33*H213
334	JACKSN	=$C34*B214	=$C34*C214	=$C34*D214	=$C34*H214
335	F_KNOX	=$C35*B215	=$C35*C215	=$C35*D215	=$C35*H215
336	[illegible]	=$C36*B216	=$C36*C216	=$C36*D216	=$C36*H216
337	FT_LEE	=$C37*B217	=$C37*C217	=$C37*D217	=$C37*H217
338	RUCKER	=$C38*B218	=$C38*C218	=$C38*D218	=$C38*H218
339	F_SILL	=$C39*B219	=$C39*C219	=$C39*D219	=$C39*H219
340	LEN_WO_	=$C40*B220	=$C40*C220	=$C40*D220	=$C40*H220
341	[illegible]	=$C41*B221	=$C41*C221	=$C41*D221	=$C41*H221
342	COMP_C	=$C42*B222	[illegible]*C222	=$C42*D222	=$C42*H222
343	[illegible]	=$C43*B223	[illegible] C223	=$C43*D223	=$C43*H223
344	PUEBLO	=$C44*B224	=$C [illegible] C224	=$C44*D224	=$C44*H224
345	RED_RV	=$C45*B225	=$C4[illegible] C225	=$C45*D225	=$C45*H225
346	ROCK_I	=$C46*B226	=$C46*C226	=$C46*D226	=$C46*H226
347	TOOELE	=$C47*B227	=$C47*C227	=$C47*D227	=$C47*H227
348	[illegible]	=$C48*B228	=$C48*C228	=$C48*D228	=$C48*H228

Table E-2. Core ECO Spreadsheet - Formula View (page 5 of 8 pages)

	A	B	C	D	H
349	HO_AAP	=$C49*B229	=$C49*C229	=$C49*D229	=$C49*H229
350	LK_AAP	=$C50*B230	=$C50*C230	=$C50*D230	=$C50*H230
351	RD_AAP	=$C51*B231	=$C51*C231	=$C51*D231	=$C51*H231
352	[illegible]	=$C52*B232	=$C52*C232	=$C52*D232	=$C52*H232
353	[illegible]	=$C53*B233	=$C53*C233	=$C53*D233	=$C53*H233
354	[illegible]	=$C54*B234	=$C54*C234	=$C54*D234	=$C54*H234
355	[illegible]	=$C55*B235	=$C55*C235	=$C55*D235	=$C55*H235
356	[illegible]	=$C56*B236	=$C56*C236	=$C56*D236	=$C56*H236
357	W_S_MR	=$C57*B237	=$C57*C237	=$C57*D237	=$C57*H237
358	[illegible]	=$C58*B238	=$C58*C238	=$C58*D238	=$C58*H238
359	[illegible]	=$C59*B239	=$C59*C239	=$C59*D239	=$C59*H239
360	[illegible]	=$C60*B240	=$C60*C240	=$C60*D240	=$C60*H240
361			sumproduct formulas are used in ne		
362	Total	=SUMPRODUCT($C11:$C60,B191:B240)	=SUMPRODUCT($C11:$C60,C191:C240)	=SUMPRODUCT($C11:$C60,D191:D240)	=SUMPRODUCT($C11:$C60,H191:H240)
363	Gd Tot	=SUM(B362:M362)			
364	(total an				
365					
366					
367					
368		Annual Demand Savings			
369		in Kilowatts			
370		fy94	fy95	fy96	fy00
371	[illegible]	=$D11*B191	=$D11*C191	=$D11*D191	=$D11*H191
372	[illegible]	=$D12*B192	=$D12*C192	=$D12*D192	=$D12*H192
373	[illegible]	=$D13*B193	=$D13*C193	=$D13*D193	=$D13*H193
374	[illegible]	=$D14*B194	=$D14*C194	=$D14*D194	=$D14*H194
375	F_DRUM	=$D15*B195	=$D15*C195	=$D15*D195	=$D15*H195
376	F_HOOD	=$D16*B196	=$D16*C196	=$D16*D196	=$D16*H196
377	S_HOUS	=$D17*B197	=$D17*C197	=$D17*D197	=$D17*H197
378	[illegible]	=$D18*B198	=$D18*C198	=$D18*D198	=$D18*H198
379	[illegible]	=$D19*B199	=$D19*C199	=$D19*D199	=$D19*H199
380	[illegible]	=$D20*B200	=$D20*C200	=$D20*D200	=$D20*H200
381	[illegible]	=$D21*B201	=$D21*C201	=$D21*D201	=$D21*H201
382	[illegible]	=$D22*B202	=$D22*C202	=$D22*D202	=$D22*H202
383	FT_ORD	=$D23*B203	=$D23*C203	=$D23*D203	=$D23*H203
384	F_POLK	=$D24*B204	=$D24*C204	=$D24*D204	=$D24*H204
385	RILEY	=$D25*B205	=$D25*C205	=$D25*D205	=$D25*H205
386	[illegible]	=$D26*B206	=$D26*C206	=$D26*D206	=$D26*H206
387	STEWRT	=$D27*B207	=$D27*C207	=$D27*D207	=$D27*H207
388	[illegible]	=$D28*B208	=$D28*C208	=$D28*D208	=$D28*H208
389	BLISS	=$D29*B209	=$D29*C209	=$D29*D209	=$D29*H209
390	FT_DIX	=$D30*B210	=$D30*C210	=$D30*D210	=$D30*H210
391	[illegible]	=$D31*B211	=$D31*C211	=$D31*D211	=$D31*H211
392	[illegible]	=$D32*B212	=$D32*C212	=$D32*D212	=$D32*H212
393	[illegible]	=$D33*B213	=$D33*C213	=$D33*D213	=$D33*H213
394	[illegible]	=$D34*B214	=$D34*C214	=$D34*D214	=$D34*H214
395	F_KNOX	=$D35*B215	=$D35*C215	=$D35*C215	=$D35*H215
396	[illegible]	=$D36*B216	=$D36*C216	=$D36*D216	=$D36*H216
397	FT_LEE	=$D37*B217	=$D37*C217	=$D37*D217	=$D37*H217
398	[illegible]	=$D38*B218	=$D38*C218	=$D38*D218	=$D38*H218
399	F_SILL	=$D39*B219	=$D39*C219	=$D39*D219	=$D39*H219
400	LEN_WD	=$D40*B220	=$D40*C220	=$D40*D220	=$D40*H220
401	[illegible]	=$D41*B221	=$D41*C221	=$D41*D221	=$D41*H221
402	CORP_C	=$D42*B222	=$D42*C222	=$D42*D222	=$D42*H222
403	[illegible]	=$D43*B223	=$D43*C223	=$D43*D223	=$D43*H223
404	PUEBLO	=$D44*B224	=$D44*C224	=$D44*D224	=$D44*H224
405	RED_RV	=$D45*B225	=$D45*C225	=$D45*D225	=$D45*H225
406	ROCK_I	=$D46*B226	=$D46*C226	=$D46*D226	=$D46*H226
407	TOOELE	=$D47*B227	=$D47*C227	=$D47*D227	=$D47*H227
408	[illegible]	=$D48*B228	=$D48*C228	=$D48*D228	=$D48*H228
409	HO_AAP	=$D49*B229	=$D49*C229	=$D49*D229	=$D49*H229
410	LK_AAP	=$D50*B230	=$D50*C230	=$D50*D230	=$D50*H230
411	RD_AAP	=$D51*B231	=$D51*C231	=$D51*D231	=$D51*H231
412	[illegible]	=$D52*B232	=$D52*C232	=$D52*D232	=$D52*H232
413	[illegible]	=$D53*B233	=$D53*C233	=$D53*D233	=$D53*H233
414	[illegible]	=$D54*B234	=$D54*C234	=$D54*D234	=$D54*H234
415	[illegible]	=$D55*B235	=$D55*C235	=$D55*D235	=$D55*H235
416	[illegible]	=$D56*B236	=$D56*C236	=$D56*D236	=$D56*H236
417	W_S_MR	=$D57*B237	=$D57*C237	=$D57*D237	=$D57*H237
418	[illegible]	=$D58*B238	=$D58*C238	=$D58*D238	=$D58*H238
419	[illegible]	=$D59*B239	=$D59*C239	=$D59*D239	=$D59*H239
420	[illegible]	=$D60*B240	=$D60*C240	=$D60*D240	=$D60*H240
421			sumproduct formulas are used in ne		
422	Total	=SUMPRODUCT($D11:$D60,B191:B240)	=SUMPRODUCT($D11:$D60,C191:C240)	=SUMPRODUCT($D11:$D60,D191:D240)	=SUMPRODUCT($D11:$D60,H191:H240)
423	Gd Tot	=SUM(B422:M422)			
424	(total an				
425					
426					
427					
428		Annual Cost Savings			
429		in 1000s of dollars			
430		fy94	fy95	fy96	fy00
431	[illegible]	=B71*B191	=C71*C191	=D71*D191	=H71*H191
432	[illegible]	=B72*B192	=C72*C192	=D72*D192	=H72*H192
433	[illegible]	=B73*B193	=C73*C193	=D73*D193	=H73*H193
434	[illegible]	=B74*B194	=C74*C194	=D74*D194	=H74*H194
435	F_DRUM	=B75*B195	=C75*C195	=D75*D195	=H75*H195

Table E-2. Core ECO Spreadsheet - Formula View (page 6 of 8 pages)

	A	B	C	D	H
436	P_HOD	=B76*B196	=C76*C196	=D76*D196	=H76*H196
437	S_HOS	=B77*B197	=C77*C197	=D77*D197	=H77*H197
438	[illegible]	=B78*B198	=C78*C198	=D78*D198	=H78*H198
439	[illegible]	=B79*B199	=C79*C199	=D79*D199	=H79*H199
440	[illegible]	=B80*B200	=C80*C200	=D80*D200	=H80*H200
441	[illegible]	=B81*B201	=C81*C201	=D81*D201	=H81*H201
442	[illegible]	=B82*B202	=C82*C202	=D82*D202	=H82*H202
443	PT_ORD	=B83*B203	=C83*C203	=D83*D203	=H83*H203
444	P_KLK	=B84*B204	=C84*C204	=D84*D204	=H84*H204
445	[illegible]	=B85*B205	=C85*C205	=D85*D205	=H85*H205
446	[illegible]	=B86*B206	=C86*C206	=D86*D206	=H86*H206
447	[illegible]	=B87*B207	=C87*C207	=D87*D207	=H87*H207
448	[illegible]	=B88*B208	=C88*C208	=D88*D208	=H88*H208
449	[illegible]	=B89*B209	=C89*C209	=D89*D209	=H89*H209
450	PT_DEX	=B90*B210	=C90*C210	=D90*D210	=H90*H210
451	[illegible]	=B91*B211	=C91*C211	=D91*D211	=H91*H211
452	[illegible]	=B92*B212	=C92*C212	=D92*D212	=H92*H212
453	[illegible]	=B93*B213	=C93*C213	=D93*D213	=H93*H213
454	[illegible]	=B94*B214	=C94*C214	=D94*D214	=H94*H214
455	P_JACK	=B95*B215	=C95*C215	=D95*D215	=H95*H215
456	[illegible]	=B96*B216	=C96*C216	=D96*D216	=H96*H216
457	PT_LMS	=B97*B217	=C97*C217	=D97*D217	=H97*H217
458	[illegible]	=B98*B218	=C98*C218	=D98*D218	=H98*H218
459	P_SILL	=B99*B219	=C99*C219	=D99*D219	=H99*H219
460	[illegible]	=B100*B220	=C100*C220	=D100*D220	=H100*H220
461	[illegible]	=B101*B221	=C101*C221	=D101*D221	=H101*H221
462	COMP_C	=B102*B222	=C102*C222	=D102*D222	=H102*H222
463	PINE_B	=B103*B223	=C103*C223	=D103*D223	=H103*H223
464	[illegible]	=B104*B224	=C104*C224	=D104*D224	=H104*H224
465	[illegible]	=B105*B225	=C105*C225	=D105*D225	=H105*H225
466	ROCK_I	=B106*B226	=C106*C226	=D106*D226	=H106*H226
467	TOOELE	=B107*B227	=C107*C227	=D107*D227	=H107*H227
468	[illegible]	=B108*B228	=C108*C228	=D108*D228	=H108*H228
469	HD_AAP	=B109*B229	=C109*C229	=D109*D229	=H109*H229
470	LK_AAP	=B110*B230	=C110*C230	=D110*D230	=H110*H230
471	SD_AAP	=B111*B231	=C111*C231	=D111*D231	=H111*H231
472	[illegible]	=B112*B232	=C112*C232	=D112*D232	=H112*H232
473	[illegible]	=B113*B233	=C113*C233	=D113*D233	=H113*H233
474	[illegible]	=B114*B234	=C114*C234	=D114*D234	=H114*H234
475	[illegible]	=B115*B235	=C115*C235	=D115*D235	=H115*H235
476	[illegible]	=B116*B236	=C116*C236	=D116*D236	=H116*H236
477	[illegible]	=B117*B237	=C117*C237	=D117*D237	=H117*H237
478	[illegible]	=B118*B238	=C118*C238	=D118*D238	=H118*H238
479	[illegible]	=B119*B239	=C119*C239	=D119*D239	=H119*H239
480	[illegible]	=B120*B240	=C120*C240	=D120*D240	=H120*H240
481			sumproduct formulas are used in re		
482	Total	=SUMPRODUCT(B71:B120,B191:B240)	=SUMPRODUCT(C71:C120,C191:C240)	=SUMPRODUCT(D71:D120,D191:D240)	=SUMPRODUCT(H71:H120,H191:H240)
483	Gd Tot	=SUM(B482:M482)			
484	(total an				
485					
486					
487					
488		Annual Environmental Savings			
489		in short tons			
490		fy94	fy95	fy96	fy00
491	[illegible]	=$F11*B191	=$F11*C191	=$F11*D191	=$F11*H191
492	[illegible]	=$F12*B192	=$F12*C192	=$F12*D192	=$F12*H192
493	[illegible]	=$F13*B193	=$F13*C193	=$F13*D193	=$F13*H193
494	[illegible]	=$F14*B194	=$F14*C194	=$F14*D194	=$F14*H194
495	[illegible]	=$F15*B195	=$F15*C195	=$F15*D195	=$F15*H195
496	P_HOD	=$F16*B196	=$F16*C196	=$F16*D196	=$F16*H196
497	S_HOS	=$F17*B197	=$F17*C197	=$F17*D197	=$F17*H197
498	[illegible]	=$F18*B198	=$F18*C198	=$F18*D198	=$F18*H198
499	[illegible]	=$F19*B199	=$F19*C199	=$F19*D199	=$F19*H199
500	[illegible]	=$F20*B200	=$F20*C200	=$F20*D200	=$F20*H200
501	[illegible]	=$F21*B201	=$F21*C201	=$F21*D201	=$F21*H201
502	[illegible]	=$F22*B202	=$F22*C202	=$F22*D202	=$F22*H202
503	PT_ORD	=$F23*B203	=$F23*C203	=$F23*D203	=$F23*H203
504	P_KLK	=$F24*B204	=$F24*C204	=$F24*D204	=$F24*H204
505	[illegible]	=$F25*B205	=$F25*C205	=$F25*D205	=$F25*H205
506	[illegible]	=$F26*B206	=$F26*C206	=$F26*D206	=$F26*H206
507	[illegible]	=$F27*B207	=$F27*C207	=$F27*D207	=$F27*H207
508	[illegible]	=$F28*B208	=$F28*C208	=$F28*D208	=$F28*H208
509	[illegible]	=$F29*B209	=$F29*C209	=$F29*D209	=$F29*H209
510	PT_DEX	=$F30*B210	=$F30*C210	=$F30*D210	=$F30*H210
511	[illegible]	=$F31*B211	=$F31*C211	=$F31*D211	=$F31*H211
512	[illegible]	=$F32*B212	=$F32*C212	=$F32*D212	=$F32*H212
513	[illegible]	=$F33*B213	=$F33*C213	=$F33*D213	=$F33*H213
514	[illegible]	=$F34*B214	=$F34*C214	=$F34*D214	=$F34*H214
515	P_JACK	=$F35*B215	=$F35*C215	=$F35*D215	=$F35*H215
516	[illegible]	=$F36*B216	=$F36*C216	=$F36*D216	=$F36*H216
517	PT_LMS	=$F37*B217	=$F37*C217	=$F37*D217	=$F37*H217
518	[illegible]	=$F38*B218	=$F38*C218	=$F38*D218	=$F38*H218
519	P_SILL	=$F39*B219	=$F39*C219	=$F39*D219	=$F39*H219
520	[illegible]	=$F40*B220	=$F40*C220	=$F40*D220	=$F40*H220
521	[illegible]	=$F41*B221	=$F41*C221	=$F41*D221	=$F41*H221
522	COMP_C	=$F42*B222	=$F42*C222	=$F42*D222	=$F42*H222

Table E-2. Core ECO Spreadsheet - Formula View (page 7 of 8 pages)

	A	B	C	D	H
523	FINE_B	=$F43*B223	=$F43*C223	=$F43*D223	=$F43*H223
524	[illegible]	=$F44*B224	=$F44*C224	=$F44*D224	=$F44*H224
525	MID_BV	=$F45*B225	=$F45*C225	=$F45*D225	=$F45*H225
526	ROCK_I	=$F46*B226	=$F46*C226	=$F46*D226	=$F46*H226
527	TOOELE	=$F47*B227	=$F47*C227	=$F47*D227	=$F47*H227
528	[illegible]	=$F48*B228	=$F48*C228	=$F48*D228	=$F48*H228
529	IO_AAP	=$F49*B229	=$F49*C229	=$F49*D229	=$F49*H229
530	LK_AAP	=$F50*B230	=$F50*C230	=$F50*D230	=$F50*H230
531	RD_AAP	=$F51*B231	=$F51*C231	=$F51*D231	=$F51*H231
532	[illegible]	=$F52*B232	=$F52*C232	=$F52*D232	=$F52*H232
533	[illegible]	=$F53*B233	=$F53*C233	=$F53*D233	=$F53*H233
534	[illegible]	=$F54*B234	=$F54*C234	=$F54*D234	=$F54*H234
535	[illegible]	=$F55*B235	=$F55*C235	=$F55*D235	=$F55*H235
536	[illegible]	=$F56*B236	=$F56*C236	=$F56*D236	=$F56*H236
537	M_S_HB	=$F57*B237	=$F57*C237	=$F57*D237	=$F57*H237
538	[illegible]	=$F58*B238	=$F58*C238	=$F58*D238	=$F58*H238
539	[illegible]	=$F59*B239	=$F59*C239	=$F59*D239	=$F59*H239
540	[illegible]	=$F60*B240	=$F60*C240	=$F60*D240	=$F60*H240
541			sumproduct formulas are used in ne		
542	Total	=SUMPRODUCT($F11:$F60,B191:B240)	=SUMPRODUCT($F11:$F60,C191:C240)	=SUMPRODUCT($F11:$F60,D191:D240)	=SUMPRODUCT($F11:$F60,H191:H240)
543	Gd Tot	=SUM(B542:M542)			
544	(total an				
545					
546					
547					
548					
549					
550					
551					
552					
553					
554					
555		Postprocessor			
556		Data and Formulas below are not sent to tl			
557		Data:	Logic:	Logic:	
558		Quantity	Percent	Quantity	
559		Fixtures/	fy93	fy93	
560		Opportunl..	Penetrati	Penetration	
561	[illegible]	0	=100-G11	=B561*C561/100	
562	[illegible]	0	=100-G12	=B562*C562/100	
563	[illegible]	0	=100-G13	=B563*C563/100	
564	[illegible]	0	=100-G14	=B564*C564/100	
565	[illegible]	0	=100-G15	=B565*C565/100	
566	[illegible]	0	=100-G16	=B566*C566/100	
567	[illegible]	0	=100-G17	=B567*C567/100	
568	[illegible]	0	=100-G18	=B568*C568/100	
569	[illegible]	0	=100-G19	=B569*C569/100	
570	[illegible]	0	=100-G20	=B570*C570/100	
571	[illegible]	0	=100-G21	=B571*C571/100	
572	[illegible]	0	=100-G22	=B572*C572/100	
573	[illegible]	0	=100-G23	=B573*C573/100	
574	[illegible]	0	=100-G24	=B574*C574/100	
575	[illegible]	0	=100-G25	=B575*C575/100	
576	[illegible]	0	=100-G26	=B576*C576/100	
577	[illegible]	0	=100-G27	=B577*C577/100	
578	[illegible]	0	=100-G28	=B578*C578/100	
579	[illegible]	0	=100-G29	=B579*C579/100	
580	PT_DEX	0	=100-G30	=B580*C580/100	
581	[illegible]	0	=100-G31	=B581*C581/100	
582	[illegible]	0	=100-G32	=B582*C582/100	
583	[illegible]	0	=100-G33	=B583*C583/100	
584	[illegible]	0	=100-G34	=B584*C584/100	
585	[illegible]	0	=100-G35	=B585*C585/100	
586	[illegible]	0	=100-G36	=B586*C586/100	
587	[illegible]	0	=100-G37	=B587*C587/100	
588	[illegible]	0	=100-G38	=B588*C588/100	
589	[illegible]	0	=100-G39	=B589*C589/100	
590	[illegible]	0	=100-G40	=B590*C590/100	
591	[illegible]	0	=100-G41	=B591*C591/100	
592	COMP_C	0	=100-G42	=B592*C592/100	
593	FINE_B	0	=100-G43	=B593*C593/100	
594	[illegible]	0	=100-G44	=B594*C594/100	
595	MID_BV	0	=100-G45	=B595*C595/100	
596	ROCK_I	0	=100-G46	=B596*C596/100	
597	TOOELE	0	=100-G47	=B597*C597/100	
598	[illegible]	0	=100-G48	=B598*C598/100	
599	IO_AAP	0	=100-G49	=B599*C599/100	
600	LK_AAP	0	=100-G50	=B600*C600/100	
601	RD_AAP	0	=100-G51	=B601*C601/100	
602	[illegible]	0	=100-G52	=B602*C602/100	
603	[illegible]	0	=100-G53	=B603*C603/100	
604	[illegible]	0	=100-G54	=B604*C604/100	
605	[illegible]	0	=100-G55	=B605*C605/100	
606	[illegible]	0	=100-G56	=B606*C606/100	
607	M_S_HB	0	=100-G57	=B607*C607/100	
608	[illegible]	0	=100-G58	=B608*C608/100	
609	[illegible]	0	=100-G59	=B609*C609/100	

Table E-2. Core ECO Spreadsheet - Formula View (page 8 of 8 pages)

	A	B	C	D	H
610	[illegible]	0	=100-G60	=B610*C610/100	
611					
612					
613					
614					
615					
616					
617					
618					
619		Cumulative quantity penetration also			
620		fy94	fy95	fy96	fy00
621	[illegible]	=B191*$B$561/100	=C191*$B$561/100	=D191*$B$561/100	=H191*$B$561/100
622	CY [illegible]	=B192*$B$562/100	=C192*$B$562/100	=D192*$B$562/100	=H192*$B$562/100
623	[illegible]	=B193*$B$563/100	=C193*$B$563/100	=D193*$B$563/100	=H193*$B$563/100
624	[illegible]	=B194*$B$564/100	=C194*$B$564/100	=D194*$B$564/100	=H194*$B$564/100
625	P_[illegible]	=B195*$B$565/100	=C195*$B$565/100	=D195*$B$565/100	=H195*$B$565/100
626	P_[illegible]	=B196*$B$566/100	=C196*$B$566/100	=D196*$B$566/100	=H196*$B$566/100
627	S_[illegible]	=B197*$B$567/100	=C197*$B$567/100	=D197*$B$567/100	=H197*$B$567/100
628	[illegible]	=B198*$B$568/100	=C198*$B$568/100	=D198*$B$568/100	=H198*$B$568/100
629	[illegible]	=B199*$B$569/100	=C199*$B$569/100	=D199*$B$569/100	=H199*$B$569/100
630	[illegible]	=B200*$B$570/100	=C200*$B$570/100	=D200*$B$570/100	=H200*$B$570/100
631	[illegible]	=B201*$B$571/100	=C201*$B$571/100	=D201*$B$571/100	=H201*$B$571/100
632	[illegible]	=B202*$B$572/100	=C202*$B$572/100	=D202*$B$572/100	=H202*$B$572/100
633	PT_[illegible]	=B203*$B$573/100	=C203*$B$573/100	=D203*$B$573/100	=H203*$B$573/100
634	P_[illegible]	=B204*$B$574/100	=C204*$B$574/100	=D204*$B$574/100	=H204*$B$574/100
635	[illegible]	=B205*$B$575/100	=C205*$B$575/100	=D205*$B$575/100	=H205*$B$575/100
636	[illegible]	=B206*$B$576/100	=C206*$B$576/100	=D206*$B$576/100	=H206*$B$576/100
637	[illegible]	=B207*$B$577/100	=C207*$B$577/100	=D207*$B$577/100	=H207*$B$577/100
638	[illegible]	=B208*$B$578/100	=C208*$B$578/100	=D208*$B$578/100	=H208*$B$578/100
639	[illegible]	=B209*$B$579/100	=C209*$B$579/100	=D209*$B$579/100	=H209*$B$579/100
640	PT_[illegible]	=B210*$B$580/100	=C210*$B$580/100	=D210*$B$580/100	=H210*$B$580/100
641	[illegible]	=B211*$B$581/100	=C211*$B$581/100	=D211*$B$581/100	=H211*$B$581/100
642	[illegible]	=B212*$B$582/100	=C212*$B$582/100	=D212*$B$582/100	=H212*$B$582/100
643	[illegible]	=B213*$B$583/100	=C213*$B$583/100	=D213*$B$583/100	=H213*$B$583/100
644	[illegible]	=B214*$B$584/100	=C214*$B$584/100	=D214*$B$584/100	=H214*$B$584/100
645	P_[illegible]	=B215*$B$585/100	=C215*$B$585/100	=D215*$B$585/100	=H215*$B$585/100
646	[illegible]	=B216*$B$586/100	=C216*$B$586/100	=D216*$B$586/100	=H216*$B$586/100
647	PT_[illegible]	=B217*$B$587/100	=C217*$B$587/100	=D217*$B$587/100	=H217*$B$587/100
648	[illegible]	=B218*$B$588/100	=C218*$B$588/100	=D218*$B$588/100	=H218*$B$588/100
649	P_[illegible]	=B219*$B$589/100	=C219*$B$589/100	=D219*$B$589/100	=H219*$B$589/100
650	[illegible]	=B220*$B$590/100	=C220*$B$590/100	=D220*$B$590/100	=H220*$B$590/100
651	[illegible]	=B221*$B$591/100	=C221*$B$591/100	=D221*$B$591/100	=H221*$B$591/100
652	COMP_C	=B222*$B$592/100	=C222*$B$592/100	=D222*$B$592/100	=H222*$B$592/100
653	[illegible]_S	=B223*$B$593/100	=C223*$B$593/100	=D223*$B$593/100	=H223*$B$593/100
654	[illegible]	=B224*$B$594/100	=C224*$B$594/100	=D224*$B$594/100	=H224*$B$594/100
655	[illegible]_JV	=B225*$B$595/100	=C225*$B$595/100	=D225*$B$595/100	=H225*$B$595/100
656	[illegible]_I	=B226*$B$596/100	=C226*$B$596/100	=D226*$B$596/100	=H226*$B$596/100
657	[illegible]	=B227*$B$597/100	=C227*$B$597/100	=D227*$B$597/100	=H227*$B$597/100
658	[illegible]	=B228*$B$598/100	=C228*$B$598/100	=D228*$B$598/100	=H228*$B$598/100
659	IO_AAP	=B229*$B$599/100	=C229*$B$599/100	=D229*$B$599/100	=H229*$B$599/100
660	LK_AAP	=B230*$B$600/100	=C230*$B$600/100	=D230*$B$600/100	=H230*$B$600/100
661	[illegible]_AAP	=B231*$B$601/100	=C231*$B$601/100	=D231*$B$601/100	=H231*$B$601/100
662	[illegible]	=B232*$B$602/100	=C232*$B$602/100	=D232*$B$602/100	=H232*$B$602/100
663	[illegible]	=B233*$B$603/100	=C233*$B$603/100	=D233*$B$603/100	=H233*$B$603/100
664	[illegible]	=B234*$B$604/100	=C234*$B$604/100	=D234*$B$604/100	=H234*$B$604/100
665	[illegible]	=B235*$B$605/100	=C235*$B$605/100	=D235*$B$605/100	=H235*$B$605/100
666	[illegible]	=B236*$B$606/100	=C236*$B$606/100	=D236*$B$606/100	=H236*$B$606/100
667	V_S_[illegible]	=B237*$B$607/100	=C237*$B$607/100	=D237*$B$607/100	=H237*$B$607/100
668	[illegible]	=B238*$B$608/100	=C238*$B$608/100	=D238*$B$608/100	=H238*$B$608/100
669	V_[illegible]	=B239*$B$609/100	=C239*$B$609/100	=D239*$B$609/100	=H239*$B$609/100
670	[illegible]	=B240*$B$610/100	=C240*$B$610/100	=D240*$B$610/100	=H240*$B$610/100
671					
672					
673		Quantity			
674		fy93			
675		Penetration			
676		by ECO			
677		=SUM(D561:D610)			
678					
679		Cumulative quantity penetration by E			
680		=SUM(B621:B670)	=SUM(C621:C670)	=SUM(D621:D670)	=SUM(H621:H670)
681					
682					
683		Cumulative quantity penetration by E			
684		fy94	fy95	fy96	
685		=$B677+B680	=$B677+C680	=$B677+D680	=$B677+H680
686					
687	end				

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 1 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1								RISC	RISC	RISC	RISC	RISC	RISC	
2														
3														
4														
5														
6														
7														
8		DATA												
9														
10		Fraction [0,1] for cost savings rolled over												
11	1	0.3333												
12		Annual investment funding limitations (Budget) in 1000s of dollars												
13		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
14	Budget	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	87945.329	
15														
16		Weights for Objectives												
17	2	ES	DS	CS	EnvirS									
18		0	0	1	0									
19														
20														
21	3	LOGIC												
22		Multiple Objective Function												
23		(variables with zero coeff removed)												
24	4	2361771.6												
25														
26		Total annual investment costs												
27	5	87945.329	110434.66	123396.58	133814.32	143054.71	151464.7	159044.26	146189.38	0	0	0	0	
28														
29		Total annual energy savings												
30		3637.8228	5499.5848	7813.0943	10234.29	11949.259	13252.195	14966.35	16823.804	16823.804	16823.804	16823.804	16823.804	
31		Grand total energy savings (1000s of MBtus)												
32		151,462												
33														
34		Total annual demand savings												
35		150204.36	274263.14	368577.59	462054.07	552472.34	607480.12	675232.88	724128.21	724128.21	724128.21	724128.21	724128.21	
36		Grand total demand savings (kilowatts)												
37		6,710,926												
38														
39	6	Total annual cost savings												
40		67474.744	106364.4	137620.73	165344.67	190577.18	213318.13	233841.7	249446.02	249446.02	249446.02	249446.02	249446.02	
41		Grand total costs savings (1000s of dollars)												
42	7	2,361,772												
43														
44		Total annual environmental savings												
45		558648.89	870242.06	1203088.1	1516177.5	1785264.2	2009535.3	2210702.8	2415336.9	2415336.9	2415336.9	2415336.9	2415336.9	

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 2 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
46		Grand total environmental savings (stons)												
47		22,230,343												
48														
49		Annual budget + cost savings rolled over from previous year												
50	8	fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
51		see budget	110434.66	123396.58	133814.32	143054.71	151464.7	159044.26	165884.77	171085.69	171085.69	171085.69	171085.69	
52														
53		Enforcement of cost limit												
54		unused amount shown												
55	9	fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
56		9.850E-05	6.802E-05	-8.22E-05	5.975E-05	4.341E-05	0.0001373	6.925E-05	19695.383	171085.69	171085.69	171085.69	171085.69	
57														
58														
59		LINKS (Rels to other spreadsheets)												
60														
61		Total annual investment costs by E(												
62	10	(do not copy down, can copy across)												
63		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
64	F01_2X4FL	22832.511	43041.777	33816.827	34492.789	12222.084	3755.1105	0	0	0	0	0	0	F01
65	F02_COMFL	12873.58	0	0	0	0	0	0	487.22	0	0	0	0	F02
66	F03_EXLIT	1215.06	1605.0375	439.8075	0	0	0	0	0	0	0	0	0	F03
67	F04_OCSEN	1400.68	1990.915	701.195	1092.12	2649.455	2520.92	2080.12	517.75	0	0	0	0	F04
68	F05_SLAMP	1186.1981	3304.6501	7851.2827	1422.1875	3317.4241	196.87406	0	2779.1192	0	0	0	0	F05
69	F06_OLTCN	3146.3322	1278.1645	3685.1469	1105.755	2439.4674	316.20121	132.89311	236.74661	0	0	0	0	F06
70	F07_CONLL	0	0	0	2582.0492	0	2165.7848	1446.6346	3544.2908	0	0	0	0	F07
71	F08_PTHRM	1373.6325	3702.2525	541.105	396.8775	63.085	0	0	0	0	0	0	0	F08
72	F09_MBOIL	0	0	994.755	2380	2535.38	2023.51	3435.105	10920.29	0	0	0	0	F09
73	F10_COOLS	0	0	1578.87	797.13	472.05	2360.43	6723.81	6268.77	0	0	0	0	F10
74	F11_HEGAS	0	0	1832.515	1179.545	123.08	2362.405	5873.7652	11095.38	0	0	0	0	F11
75	F12_NEGAS	0	0	0	242.19	0	0	0	0	0	0	0	0	F12
76	F13_GCHIL	9	0	2436.7	0	0	31135.9	2267.6	5415	0	0	0	0	F13
77	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
78	F15_FLUEI	0	180.975	1498.2	1100.85	426.375	984.675	0	0	0	0	0	0	F15
79	F16_DUCT	8422.6433	1155.9255	0	0	0	0	0	0	0	0	0	0	F16
80	F17_HEEAC	0	0	0	0	0	0	0	3345.615	0	0	0	0	F17
81	F18_EMCS	891.23293	176.33395	2897.5759	5485.2145	6372.4241	8424.037	41554.832	40330.134	0	0	0	0	F18
82	F19_GHP	0	0	0	5034.9	23770.045	1879.1737	35809.256	524.485	0	0	0	0	F19
83	F20_RADBR	0	0	287.03657	0	828.17574	380.82761	1995.9277	940.93348	0	0	0	0	F20
84	F21_SHADD	0	0	0	0	2198.9255	454.39427	1584.833	4089.9148	0	0	0	0	F21
85	F22_RROOF	9608.4	18619.65	9179.37	19234.62	25584.75	5688.9	14433.57	9140.4	0	0	0	0	F22
86	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
87	F24_BINSL	0	0	0	612.36	1523.25	1780.965	2642.67	4316.175	0	0	0	0	F24
88	F25_CINSL	0	373.0925	1340.5975	716.5675	893.64	970.2	580.635	246.07	0	0	0	0	F25
89	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
90	F27_WINDF	0	858.7425	1605.945	483.12	1497.1275	1104.0975	67.5675	276.1275	0	0	0	0	F27
91	F28_WHBLA	794.105	153.33	0	0.475	0	0	0	0	0	0	0	0	F28

Table E-3. Core Main (Linking) Spreadsheet - Value View
(page 3 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
92	F29_HWHP	0	229.02133	0	3816.4533	0	0	0	79.744	0	0	0	0	F29
93	F30_SREST	968.86673	0	0	0	0	0	0	0	0	0	0	0	F30
94	F31_FREST	726.65006	0	0	0	0	0	0	0	0	0	0	0	F31
95	F32_DESUP	9[illegible].16962	7946.54	10774.961	8837.0611	7444.7052	6853.0668	1632.3507	21.641013	0	0	0	0	F32
96	F33_IHWH	0	0	249.07458	0	1626.975	0	0	0	0	0	0	0	F33
97	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
98	F35_HDISR	673.9553	0	0	0	0	0	0	0	0	0	0	0	F35
99	F36_MSUMP	455.65	0	0	0	0	0	0	0	0	0	0	0	F36
100	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
101	F38_WINDE	0	0	0	0	0	0	1179.6578	5353.7941	0	0	0	0	F38
102	F39_MICCM	13587.392	9098.2269	989.71715	0	0	974.82376	0	704.96813	0	0	0	0	F39
103	F40_SOLSL	0	0	6217.0808	2787.3846	10533.481	13446.894	15617.886	13755.809	0	0	0	0	F40
104	F41_SOLWH	0	0	0	357.91127	0	5967.4243	0	0	0	0	0	0	F41
105	F42_SOLWL	0	0	0	0	454.33409	1064.2553	1583.7836	2859.3032	0	0	0	0	F42
106	F43_SOLWB	0	0	0	0	0	0	0	3606.3821	0	0	0	0	F43
107	F44_RFRIG	0	331.6666	922.0792	934.388	2410.8839	965.7972	509.7722	2015.1103	0	0	0	0	F44
108	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
109	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
110	F47_DCONP	0	0	17358.562	31544.54	20432.15	46362.653	13847.32	4158.8793	0	0	0	0	F47
111	F48_VHTRR	0	0	392.40829	664.23848	1950.9541	1392.838	733.63948	4260.9605	0	0	0	0	F48
112	F49_SMOTR	2632.64	8362.8	9272.5702	4497.2698	9739.28	3676.24	0	1335.36	0	0	0	0	F49
113	F50_MMOTR	3364.8	6051.76	5152	1518.72	33.52	563.84	0	0	0	0	0	0	F50
114	F51_LMOTR	1037.92	1974.8	1681.2	495.6	10.96	184	0	0	0	0	0	0	F51
115	F52_SVSD	0	0	0	0	0	1508.4631	0	1595.567	0	0	0	0	F52
116	F53_MVSD	0	0	0	0	750.36371	0	1555.3162	983.67247	0	0	0	0	F53
117	F54_LVSD	0	0	0	0	750.36371	0	1555.3162	983.67247					F54
118														
119														
120														
121														
122		Total annual energy savings by ECO												
123		(do not copy downward, can copy across)												
124		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
125	F01_2X4FL	232.98991	681.62851	1045.531	1383.2235	1491.1841	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	F01
126	F02_COMFL	285.14101	285.14101	285.14101	285.14101	285.14101	285.14101	285.14101	299.37599	299.37599	299.37599	299.37599	299.37599	F02
127	F03_EXLIT	21.071489	50.350011	57.520776	57.520776	57.520776	57.520776	57.520776	57.520776	57.520776	57.520776	57.520776	57.520776	F03
128	F04_OCSEN	3.9679155	9.6577044	17.35404	21.612714	36.353547	51.791761	59.224977	59.71129	59.71129	59.71129	59.71129	59.71129	F04
129	F05_SLAMP	13.036425	47.677785	136.03234	152.00015	187.35431	189.52341	189.52341	219.06642	219.06642	219.06642	219.06642	219.06642	F05
130	F06_OLTCN	58.304393	81.989943	150.27906	170.76971	215.97395	221.83345	224.29608	228.68321	228.68321	228.68321	228.68321	228.68321	F06
131	F07_CONLL	0	0	0	6.6009329	6.6009329	13.389471	18.533198	30.633585	30.633585	30.633585	30.633585	30.633585	F07
132	F08_PTHRM	102.53008	355.02301	393.58531	415.09243	418.97325	418.97325	418.97325	418.97325	418.97325	418.97325	418.97325	418.97325	F08
133	F09_MBOIL	0	0	39.62807	129.79561	216.24087	296.66154	407.53123	732.21518	732.21518	732.21518	732.21518	732.21518	F09
134	F10_COOLS	0	0	0	0	0	0	0	0	0	0	0	0	F10
135	F11_HEGAS	0	0	79.337222	118.46524	122.94833	185.12636	348.58614	636.14184	636.14184	636.14184	636.14184	636.14184	F11
136	F12_NEGAS	0	0	0	6.8525274	6.8525274	6.8525274	6.8525274	6.8525274	6.8525274	6.8525274	6.8525274	6.8525274	F12
137	F13_GCHIL	0	0	-42.62069	-42.62069	-42.62069	-1025.56	-1065.874	-1187.318	-1187.318	-1187.318	-1187.318	-1187.318	F13

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 4 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
138	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
139	F15_FLUEI	0	12.020598	104.75423	187.67616	193.71395	251.3271	251.3271	251.3271	251.3271	251.3271	251.3271	251.3271	F15
140	F16_DUCT	891.40385	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	1017.1977	F16
141	F17_HEEAC	0	0	0	0	0	0	0	19.284929	19.284929	19.284929	19.284929	19.284929	F17
142	F18_EMCS	19.989451	23.093383	141.15154	279.03979	461.78124	688.49155	1539.0759	2194.5674	2194.5674	2194.5674	2194.5674	2194.5674	F18
143	F19_GHP	0	0	0	23.123561	-35.80667	-31.8862	-43.59763	-41.64367	-41.64367	-41.64367	-41.64367	-41.64367	F19
144	F20_RADBR	0	0	3.3310982	3.3310982	16.330018	21.720991	53.968788	67.854825	67.854825	67.854825	67.854825	67.854825	F20
145	F21_SHADO	0	0	0	0	5.404889	10.457185	16.240879	32.899467	32.899467	32.899467	32.899467	32.899467	F21
146	F22_RROOF	5.1220349	13.20474	17.087961	21.188652	25.514586	26.018494	28.273764	29.020836	29.020836	29.020836	29.020836	29.020836	F22
147	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
148	F24_BINSL	0	0	0	23.618446	67.1182	105.63748	163.83418	250.17571	250.17571	250.17571	250.17571	250.17571	F24
149	F25_CINSL	0	19.813305	79.489295	105.69432	134.02719	168.60091	182.3157	190.69005	190.69005	190.69005	190.69005	190.69005	F25
150	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
151	F27_WINDF	0	47.81117	117.68655	135.18061	187.24862	224.80665	226.62059	236.67093	236.67093	236.67093	236.67093	236.67093	F27
152	F28_WHOLA	129.83508	155.97187	155.97187	156.01844	156.01844	156.01844	156.01844	156.01844	156.01844	156.01844	156.01844	156.01844	F28
153	F29_HWHP	0	1.9479924	1.9479924	43.092997	43.092997	43.092997	43.092997	44.093101	44.093101	44.093101	44.093101	44.093101	F29
154	F30_SREST	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	296.02455	F30
155	F31_FREST	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	244.20985	F31
156	F32_DESUP	12.864268	245.62008	553.22267	769.69334	909.93639	1078.578	1109.3552	1109.5928	1109.5928	1109.5928	1109.5928	1109.5928	F32
157	F33_IHWH	0	0	1.4850754	1.4850754	12.927219	12.927219	12.927219	12.927219	12.927219	12.927219	12.927219	12.927219	F33
158	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
159	F35_HOISR	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	275.70124	F35
160	F36_MSUMP	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	387.63678	F36
161	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
162	F38_WINDE	0	0	0	0	0	0	9.5890611	48.565519	48.565519	48.565519	48.565519	48.565519	F38
163	F39_MICCM	550.07822	881.90097	919.21192	919.21192	919.21192	944.58882	944.58882	958.22684	958.22684	958.22684	958.22684	958.22684	F39
164	F40_SOLSL	0	0	35.77644	50.017898	117.67502	195.5314	285.57297	380.76396	380.76396	380.76396	380.76396	380.76396	F40
165	F41_SOLWH	0	0	0	1.7621051	1.7621051	34.424669	34.424669	34.424669	34.424669	34.424669	34.424669	34.424669	F41
166	F42_SOLWL	0	0	0	0	15.322012	45.849512	86.377484	161.47295	161.47295	161.47295	161.47295	161.47295	F42
167	F43_SOLWB	0	0	0	0	0	0	0	72.992647	72.992647	72.992647	72.992647	72.992647	F43
168	F44_RFRIG	0	2.353899	6.608289	14.900068	31.31955	39.621662	44.001448	59.347663	59.347663	59.347663	59.347663	59.347663	F44
169	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
170	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
171	F47_DCONP	0	0	683.25956	1872.3124	2512.047	3731.7504	4040.1133	4114.804	4114.804	4114.804	4114.804	4114.804	F47
172	F48_VHTRR	0	0	18.894097	43.44556	122.51793	180.97937	198.13705	274.85812	274.85812	274.85812	274.85812	274.85812	F48
173	F49_SMOTR	31.986926	140.10626	261.81591	316.93632	440.65582	483.32242	483.32242	499.10125	499.10125	499.10125	499.10125	499.10125	F49
174	F50_MMOTR	57.254543	160.86198	246.93916	270.24283	270.8491	279.6914	279.6914	279.6914	279.6914	279.6914	279.6914	279.6914	F50
175	F51_LMOTR	18.664785	52.440453	80.50132	88.098239	88.295879	91.178438	91.178438	91.178438	91.178438	91.178438	91.178438	91.178438	F51
176	F52_SVSD	0	0	0	0	0	5.0050012	5.0050012	10.615806	10.615806	10.615806	10.615806	10.615806	F52
177	F53_MVSD	0	0	0	0	3.0030007	3.0030007	9.6584844	13.613489	13.613489	13.613489	13.613489	13.613489	F53
178	F54_LVSD	0	0	0	0	3.0030007	3.0030007	9.6584844	13.613489	13.613489	13.613489	13.613489	13.613489	F54
179														
180														
181														
182														
183		Total annual demand savings by ECO												

Table E-3. Core Main (Linking) Spreadsheet - Value View
(page 5 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
184		(do not copy downward, can copy across)												
185		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
186	F01_2X4FL	22360.576	64353.866	[illegible]	129280.82	[illegible]9.19	143811.66	143811.66	143811.66	143811.66	143811.66	143811.66	143811.66	F01
187	F02_COMFL	72369.353	72369.353	72369.353	72369.353	72369.353	72369.353	72369.353	75240.73	75240.73	75240.73	75240.73	75240.73	F02
188	F03_EXLIT	920.8947	2128.6199	2433.8182	[illegible]	2433.8182	2433.8182	2433.8182	2433.8182	2433.8182	2433.8182	2433.8182	2433.8182	F03
189	F04_OCSEN	0	0	0	[illegible]	0	0	0	0	0	0	0	0	F04
190	F05_SLAMP	1528.5375	5612.8705	15947.519	17[illegible]	[illegible]964.153	22218.453	22218.453	25681.878	25681.878	25681.878	25681.878	25681.878	F05
191	F06_CLTCN	0	0	0	0	0	0	0	0	0	0	0	0	F06
192	F07_CONLL	0	0	0	663.[illegible]	[illegible]63.8688	1[illegible]6.8448	1690.0128	2690.5536	2690.5536	2690.5536	2690.5536	2690.5536	F07
193	F08_PTHRM	0	0	0	0	0	0	0	0	0	0	0	0	F08
194	F09_MBOIL	0	0	0	[illegible]	0	0	0	0	0	0	0	0	F09
195	F10_COOLS	0	0	2097.7538	3066.4688	[illegible]01.1137	5695.3138	14867.629	22231.804	22234.804	22234.804	22234.804	22234.804	F10
196	F11_HEGAS	0	0	0	0	0	0	0	0	0	0	0	0	F11
197	F12_NEGAS	0	0	0	0	0	0	0	0	0	0	0	0	F12
198	F13_GCHIL	0	0	1857.24	1857.24	1[illegible]24	28605.181	30300.281	34685.431	34685.431	34685.431	34685.431	34685.431	F13
199	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
200	F15_FLUEI	0	0	0	0	0	0	0	0	0	0	0	0	F15
201	F16_DUCT	0	0	0	0	0	0	0	0	0	0	0	0	F16
202	F17_HEEAC	0	0	0	0	0	0	0	1328.6023	1328.6023	1328.6023	1328.6023	1328.6023	F17
203	F18_EMCS	7396.[illegible]425	8702.0115	9101.898	11557.475	12049.262	12643.078	20875.764	26778.565	26778.565	26778.565	26778.565	26778.565	F18
204	F19_GHP	0	0	0	2088.9102	13647.208	14508.31	30077.51	30303.819	30303.819	30303.819	30303.819	30303.819	F19
205	F20_RADBR	0	0	80.690581	80.690581	261.49381	357.44168	859.67316	1054.2415	1054.2415	1054.2415	1054.2415	1054.2415	F20
206	F21_SHADD	0	0	0	0	993.46362	1208.3755	1941.1337	3798.5409	3798.5409	3798.5409	3798.5409	3798.5409	F21
207	F22_RROOF	28634 9[illegible]	72952.38	96426.315	139210.92	187578.32	198479.16	229007.25	246233.39	246233.39	246233.39	246233.39	246233.39	F22
208	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
209	F24_BINSL	0	0	0	26.33632	169.06655	415.23423	775.0307	1390.4367	1390.4367	1390.4367	1390.4367	1390.4367	F24
210	F25_CINSL	0	52.789917	280.37132	426.9772	632.91296	815.66495	940.90929	1016.5009	1016.5009	1016.5009	1016.5009	1016.5009	F25
211	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
212	F27_WINDF	0	128.15293	472.11316	570.07858	995.39419	1149.4376	1169.6665	1266.3948	1266.3948	1266.3948	1266.3948	1266.3948	F27
213	F28_WHBLA	0	0	0	0	0	0	0	0	0	0	0	0	F28
214	F29_HWHP	0	-84.252	-84.252	-1284.908	-1284.908	-1284.908	-1284.908	-1311.22	-1311.22	-1311.22	-1311.22	-1311.22	F29
215	F30_SREST	0	0	0	0	0	0	0	0	0	0	0	0	F30
216	F31_FREST	0	0	0	0	0	0	0	0	0	0	0	0	F31
217	F32_DESUP	611.08747	6128.7446	13274.777	18810.056	23198.944	27491.222	28560.266	28575.218	28575.218	28575.218	28575.218	28575.218	F32
218	F33_IHWH	0	0	0	0	0	0	0	0	0	0	0	0	F33
219	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
220	F35_HDISR	0	0	0	0	0	0	0	0	0	0	0	0	F35
221	F36_MSUMP	0	0	0	0	0	0	0	0	0	0	0	0	F36
222	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
223	F38_WINDE	0	0	0	0	0	0	321.7025	1629.32	1629.32	1629.32	1629.32	1629.32	F38
224	F39_MICCM	11726.735	19793	20819.886	20819.886	20819.886	20819.886	20819.886	20819.886	20819.886	20819.886	20819.886	20819.886	F39
225	F40_SOLSL	0	0	0	0	0	0	0	0	0	0	0	0	F40
226	F41_SOLWH	0	0	0	0	0	0	0	0	0	0	0	0	F41
227	F42_SOLWL	0	0	0	0	0	0	0	0	0	0	0	0	F42
228	F43_SOLWB	0	0	0	0	0	0	0	0	0	0	0	0	F43
229	F44_RFRIG	0	0	0	0	0	0	0	0	0	0	0	0	F44

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 6 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
230	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
231	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
232	F47_DCOMP	0	0	0	0	0	0	0	0	0	0	0	0	F47
233	F48_VHTRR	0	0	0	0	0	0	0	0	0	0	0	0	F48
234	F49_SMOTR	2002.5822	8771.5308	16391.319	19842.202	27587.819	30259.016	30259.016	31246.87	31246.87	31246.87	31246.87	31246.87	F49
235	F50_MMOTR	3584.4936	10070.969	15459.941	16918.897	16956.853	17510.436	17510.436	17510.436	17510.436	17510.436	17510.436	17510.436	F50
236	F51_LMOTR	1168.5326	3283.1014	5039.8877	5515.5025	5527.876	5708.3423	5708.3423	5708.3423	5708.3423	5708.3423	5708.3423	5708.3423	F51
237	F52_SVSD	0	0	0	0	0	0	0	0	0	0	0	0	F52
238	F53_MVSD	0	0	0	0	0	0	0	0	0	0	0	0	F53
239	F54_LVSD	0	0	0	0	0	0	0	0	0	0	0	0	F54
240														
241														
242														
243														
244	11	Total annual cost savings by ECO												
245		(do not copy downward, can copy across)												
246		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
247	F01_2X4FL	12263.109	27164.136	35980.639	43265.521	45477.308	46009.807	46009.807	46009.807	46009.807	46009.807	46009.807	46009.807	F01
248	F02_COMFL	19430.405	19430.405	19430.405	19430.405	19430.405	19430.405	19430.405	19480.3	19480.3	19480.3	19480.3	19480.3	F02
249	F03_EXLIT	818.07	1422.7125	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	1538.7075	F03
250	F04_OCSEN	733.305	1420.135	1596.095	1824.665	2292.35	2677.1	2951.365	3004.28	3004.28	3004.28	3004.28	3004.28	F04
251	F05_SLAMP	584.03695	1673.8417	3655.2504	3940.312	4534.6123	4565.6861	4565.6861	4694.8404	4694.8404	4694.8404	4694.8404	4694.8404	F05
252	F06_OLTCN	1700.0547	2103.166	2987.3093	3223.7318	3665.6532	3717.0937	3734.4368	3761.0966	3761.0966	3761.0966	3761.0966	3761.0966	F06
253	F07_CONLL	0	0	0	521.77465	521.77465	852.09663	1050.0325	1439.9492	1439.9492	1439.9492	1439.9492	1439.9492	F07
254	F08_PTHRM	721.2925	2030.8875	2174.34	2260.2875	2271.99	2271.99	2271.99	2271.99	2271.99	2271.99	2271.99	2271.99	F08
255	F09_MBOIL	0	0	239.445	738.395	1188.215	1494.47	1926.015	3094.765	3094.765	3094.765	3094.765	3094.765	F09
256	F10_COOLS	0	0	384.93	550.26	633.06	978.03	1809.63	2495.88	2495.88	2495.88	2495.88	2495.88	F10
257	F11_HEGAS	0	0	447.78	681.785	705.245	1066.325	1792.8076	2995.655	2995.655	2995.655	2995.655	2995.655	F11
258	F12_NEGAS	0	0	0	50.57	50.57	50.57	50.57	50.57	50.57	50.57	50.57	50.57	F12
259	F13_GCHIL	0	0	554.2	554.2	554.2	5026.9	5298.9	5860.4	5860.4	5860.4	5860.4	5860.4	F13
260	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
261	F15_FLUFI	0	56.325	441.15	674.625	749.475	900.75	900.75	900.75	900.75	900.75	900.75	900.75	F15
262	F16_DUCT	6891.3044	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	7257.6407	F16
263	F17_HEEAC	0	0	0	0	0	0	0	379.08	379.08	379.08	379.08	379.08	F17
264	F18_EMCS	509.0089	578.16315	1254.1451	2408.9085	3534.6671	4823.6626	10158.323	14506.247	14506.247	14506.247	14506.247	14506.247	F18
265	F19_GHP	0	0	0	1002.625	4961.58	5227.4905	9902.035	9958.065	9958.065	9958.065	9958.065	9958.065	F19
266	F20_RADBR	0	0	64.24704	64.24704	207.33163	262.2895	523.72608	627.39619	627.39619	627.39619	627.39619	627.39619	F20
267	F21_SHADD	0	0	0	0	381.17875	445.72356	658.69341	1094.5817	1094.5817	1094.5817	1094.5817	1094.5817	F21
268	F22_RROOF	4829.22	11531.43	13377.28	17910.81	22437.45	23359.77	25127.9	26093.52	26093.52	26093.52	26093.52	26093.52	F22
269	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
270	F24_BINSL	0	0	0	127.755	390.825	655.92	997.74	1462.95	1462.95	1462.95	1462.95	1462.95	F24
271	F25_CINSL	0	117.6725	458.92	609.29	763.565	913.2475	989.0925	1015.63	1015.63	1015.63	1015.63	1015.63	F25
272	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
273	F27_WINDF	0	278.9325	674.4375	772.365	1040.9025	1209.12	1218.36	1251.03	1251.03	1251.03	1251.03	1251.03	F27
274	F28_WHBLA	626.905	690.0325	690.0325	690.1275	690.1275	690.1275	690.1275	690.1275	690.1275	690.1275	690.1275	690.1275	F28
275	F29_HWHP	0	74.555705	74.555705	838.49903	838.49903	838.49903	838.49903	846.60006	846.60006	846.60006	846.60006	846.60006	F29

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 7 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
276	F30_SREST	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	1611.4748	F30
277	F31_FREST	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	1329.4219	F31
278	F32_DESUP	448.02951	3340.722	6181.2141	7928.1117	9224.6525	10295.79	10497.204	10499.685	10499.685	10499.685	10499.685	10499.685	F32
279	F33_IHWH	0	0	64.43041	64.43041	352.38488	352.38488	352.38488	352.38488	352.38488	352.38488	352.38488	352.38488	F33
280	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
281	F35_HDISR	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	1171.3325	F35
282	F36_MSUMP	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	1630	F36
283	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
284	F38_WINDE	0	0	0	0	0	0	155.79853	750.12227	750.12227	750.12227	750.12227	750.12227	F38
285	F39_MICCM	8360.9756	11830.661	12098.96	12098.96	12098.96	12236.298	12236.298	12312.402	12312.402	12312.402	12312.402	12312.402	F39
286	F40_SOLSL	0	0	1542.5867	2094.0232	3956.0886	5955.8265	8075.5529	9562.0371	9562.0371	9562.0371	9562.0371	9562.0371	F40
287	F41_SOLWH	0	0	0	75.884426	75.884426	942.4082	942.4082	942.4082	942.4082	942.4082	942.4082	942.4082	F41
288	F42_SOLWL	0	0	0	0	78.983494	236.93049	439.32339	753.51506	753.51506	753.51506	753.51506	753.51506	F42
289	F43_SOLWB	0	0	0	0	0	0	0	369.58069	369.58069	369.58069	369.58069	369.58069	F43
290	F44_RFRIG	0	101.52678	298.67994	487.9623	899.98069	1035.2537	1098.4307	1315.807	1315.807	1315.807	1315.807	1315.807	F44
291	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
292	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
293	F47_DCONP	0	0	4262.6666	10732.087	14433.766	21540.546	23398.36	23866.578	23866.578	23866.578	23866.578	23866.578	F47
294	F48_VHTRR	0	0	97.571472	244.27685	577.92972	784.94447	878.44899	1333.873	1333.873	1333.873	1333.873	1333.873	F48
295	F49_SMOTR	1334.64	4284.08	6591.2007	7554.72	9366.24	9949.2	9949.2	10102.08	10102.08	10102.08	10102.08	10102.08	F49
296	F50_MMOTR	1871.84	3948.08	5248.72	5569.04	5575.36	5661.04	5661.04	5661.04	5661.04	5661.04	5661.04	5661.04	F50
297	F51_LMOTR	610.24	1287.04	1710.96	1815.44	1817.52	1845.44	1845.44	1845.44	1845.44	1845.44	1845.44	1845.44	F51
298	F52_SVSD	0	0	0	0	0	216.55203	216.55203	390.10511	390.10511	390.10511	390.10511	390.10511	F52
299	F53_MVSD	0	0	0	0	129.93122	129.93122	324.89524	432.43476	432.43476	432.43476	432.43476	432.43476	F53
300	F54_LVSD	0	0	0	0	129.93122	129.93122	324.89524	432.43476	432.43476	432.43476	432.43476	432.43476	F54
301														
302														
303														
304														
305		Total annual environmental savings by ECO												
306		(do not copy downward, can copy across)												
307		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
308	F01_2X4FL	51098.904	151350.06	241919.53	332124.61	368701.44	378290.4	378290.4	378290.4	378290.4	378290.4	378290.4	378290.4	F01
309	F02_COMFL	147250.99	147250.99	147250.99	147250.99	147250.99	147250.99	147250.99	153585.29	153585.29	153585.29	153585.29	153585.29	F02
310	F03_EXLIT	6125.088	14458.935	16541.495	16541.495	16541.495	16541.495	16541.495	16541.495	16541.495	16541.495	16541.495	16541.495	F03
311	F04_OCSEN	3190.5667	7798.4079	10252.833	12962.87	19977.107	26923.275	31752.505	32908.686	32908.686	32908.686	32908.686	32908.686	F04
312	F05_SLAMP	2588.088	8433.3392	29849.821	33397.15	42027.954	42549.366	42549.366	48261.619	48261.619	48261.619	48261.619	48261.619	F05
313	F06_OLTCN	7961.9631	13265.257	26852.683	32823.6	44130.646	45335.04	46023.548	46757.718	46757.718	46757.718	46757.718	46757.718	F06
314	F07_CONLL	0	0	0	1045.1936	1045.1936	2659.7948	3891.7539	6483.0444	6483.0444	6483.0444	6483.0444	6483.0444	F07
315	F0_ THRM	9750.948	32679.675	35790.903	37900.295	38252.647	38252.647	38252.647	38252.647	38252.647	38252.647	38252.647	38252.647	F08
316	_HBOIL	0	0	2346.2987	7684.9383	12803.19	17683.153	24132.069	43352.996	43352.996	43352.996	43352.996	43352.996	F09
317	F10_COOLS	0	0	0	0	0	0	0	0	0	0	0	0	F10
318	F11_HEGAS	0	0	4697.3982	7014.0898	7279.5246	10960.997	20639.088	37664.686	37664.686	37664.686	37664.686	37664.686	F11
319	F12_NEGAS	0	0	0	405.72444	405.72444	405.72444	405.72444	405.72444	405.72444	405.72444	405.72444	405.72444	F12
320	F13_GCHIL	0	0	-625.1909	-625.1909	-625.1909	-15043.65	-15635	-17416.44	-17416.44	-17416.44	-17416.44	-17416.44	F13
321	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14

Table E-3. Core Main (Linking) Spreadsheet - Value View
(page 8 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
322	F15_FLUEI	0	711.71557	6202.2885	9927.7699	11469.357	14880.575	14880.575	14880.575	14880.575	14880.575	14880.575	14880.575	F15
323	F16_DUCT	105285.05	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	115265.79	F16
324	F17_HEEAC	0	0	0	0	0	0	0	4380.5716	4380.5716	4380.5716	4380.5716	4380.5716	F17
325	F18_EMCS	2743.9574	3080.2508	13047.786	27557.572	46392.229	66820.95	148452.32	216556.18	216556.18	216556.18	216556.18	216556.18	F18
326	F19_GHP	0	0	0	4196.1494	27368.333	29000.753	55496.11	57345.612	57345.612	57345.612	57345.612	57345.612	F19
327	F20_RADBR	0	0	233.31429	233.31429	1716.4703	2463.1582	6373.2027	7695.8631	7695.8631	7695.8631	7695.8631	7695.8631	F20
328	F21_SHADD	0	0	0	0	1552.8248	2017.9245	3357.7788	6506.5446	6506.5446	6506.5446	6506.5446	6506.5446	F21
329	F22_RROOF	1644.382	4126.8207	5314.1461	7293.8936	9493.7309	9963.6522	11311.262	11965.468	11965.468	11965.468	11965.468	11965.468	F22
330	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
331	F24_BINSL	0	0	0	1997.3143	6017.6212	9535.3689	14211.25	21398.429	21398.429	21398.429	21398.429	21398.429	F24
332	F25_CINSL	0	1784.9065	7083.5941	9136.7426	11524.315	14495.316	15729.341	16450.735	16450.735	16450.735	16450.735	16450.735	F25
333	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
334	F27_WINDF	0	4300.0371	10154.569	11745.864	16067.994	19046.841	19227.68	20058.26	20058.26	20058.26	20058.26	20058.26	F27
335	F28_WHBLA	8439.5487	9987.0561	9987.0561	9997.6337	9997.6337	9997.6337	9997.6337	9997.6337	9997.6337	9997.6337	9997.6337	9997.6337	F28
336	F29_HWHP	0	174.27032	174.27032	5879.8808	5879.8808	5879.8808	5879.8808	6026.2208	6026.2208	6026.2208	6026.2208	6026.2208	F29
337	F30_SREST	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	21165.545	F30
338	F31_FREST	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	17461.016	F31
339	F32_DESUP	1404.0931	27723.806	59094.972	83117.131	102842.76	120385.91	123725.15	123764.91	123764.91	123764.91	123764.91	123764.91	F32
340	F33_IHWH	0	0	209.41489	209.41489	1928.4428	1928.4428	1928.4428	1928.4428	1928.4428	1928.4428	1928.4428	1928.4428	F33
341	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
342	F35_HDISR	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	19406.577	F35
343	F36_MSUMP	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	26858.536	F36
344	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
345	F38_WINDE	0	0	0	0	0	0	1659.3408	10939.693	10939.693	10939.693	10939.693	10939.693	F38
346	F39_MICCM	101762.73	162475.74	169843.47	169843.47	169843.47	171603.66	171603.66	172555.21	172555.21	172555.21	172555.21	172555.21	F39
347	F40_SOLSL	0	0	3461.6974	4742.4797	19958.667	29900.553	41077.1	61882.648	61882.648	61882.648	61882.648	61882.648	F40
348	F41_SOLWH	0	0	0	157.60381	157.60381	5220.2839	5220.2839	5220.2839	5220.2839	5220.2839	5220.2839	5220.2839	F41
349	F42_SOLWL	0	0	0	0	1254.1864	3312.1774	6498.3516	12264.623	12264.623	12264.623	12264.623	12264.623	F42
350	F43_SOLWB	0	0	0	0	0	0	0	5462.2642	5462.2642	5462.2642	5462.2642	5462.2642	F43
351	F44_RFRIG	0	206.56129	973.28191	2011.7831	3786.4447	5582.0491	6529.5552	10138.402	10138.402	10138.402	10138.402	10138.402	F44
352	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
353	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
354	F47_DCONP	0	0	66905.335	181975.01	247190.15	365781.79	398067.18	406272.05	406272.05	406272.05	406272.05	406272.05	F47
355	F48_VHTRR	0	0	1499.0986	4081.9607	10476.193	14389.474	15755.754	22942.461	22942.461	22942.461	22942.461	22942.461	F48
356	F49_SMOTR	7265.8302	31825.137	59471.484	71992.084	100094.97	109786.69	109786.69	113370.85	113370.85	113370.85	113370.85	113370.85	F49
357	F50_MMOTR	13005.369	36539.798	56092.23	61385.66	61523.373	63531.901	63531.901	63531.901	63531.901	63531.901	63531.901	63531.901	F50
358	F51_LMOTR	4239.7059	11911.849	18285.875	20011.515	20056.409	20711.182	20711.182	20711.182	20711.182	20711.182	20711.182	20711.182	F51
359	F52_SVSD	0	0	0	0	0	605.74407	605.74407	1635.0975	1635.0975	1635.0975	1635.0975	1635.0975	F52
360	F53_MVSD	0	0	0	0	363.44644	363.44644	1716.6766	2104.7334	2104.7334	2104.7334	2104.7334	2104.7334	F53
361	F54_LVSD	0	0	0	0	363.44644	363.44644	1716.6766	2104.7334	2104.7334	2104.7334	2104.7334	2104.7334	F54
362														
363														
364		postprocessor												
365														
366	PI	Cumulative quantity penetration by ECO												
367		(do not copy downward, can copy across)												

Table E-3. Core Main (Linking) Spreadsheet - Value View
(page 9 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
368		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
369	F01_2X4FL	372961.75	701034.33	953027.25	1208119.9	1295529.1	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3	1321798.3	F01
370	F02_COMFL	1502581.2	1502581.2	1502581.2	1502581.2	1502581.2	1502581.2	1502581.2	1552956.3	1552956.3	1552956.3	1552956.3	1552956.3	F02
371	F03_EXLIT	65325.417	120222.02	134094.67	134094.67	134094.67	134094.67	134094.67	134094.67	134094.67	134094.67	134094.67	134094.67	F03
372	F04_OCSEN	17567.6	34896.55	41531.35	51266.95	73497.9	94812.1	112148.65	116569	116569	116569	116569	116569	F04
373	F05_SLAMP	92625.909	119854.8	188752.45	201232.18	228863.41	230558.68	230558.68	253648.18	253648.18	253648.18	253648.18	253648.18	F05
374	F06_OLTCN	55626.338	66192.3	96655.613	105796.35	125962.24	128576.12	129674.68	131631.75	131631.75	131631.75	131631.75	131631.75	F06
375	F07_CONLL	16682.5	16682.5	16682.5	26287.083	26287.083	34993.333	41132.917	55608.333	55608.333	55608.333	55608.333	55608.333	F07
376	F08_PTHRM	33317.1	72037.133	78133.283	62242.85	82934.667	82934.667	82934.667	82934.667	82934.667	82934.667	82934.667	82934.667	F08
377	F09_MBOIL	516.40514	516.40514	642.98737	924.34723	1243.3361	1508.7428	1978.1626	3442.7009	3442.7009	3442.7009	3442.7009	3442.7009	F09
378	F10_COOLS	14117.336	14117.336	26104.5	31640.014	34695.129	52376.271	99075.214	141173.36	141173.36	141173.36	141173.36	141173.36	F10
379	F11_HEGAS	3160.2217	3160.2217	4636.265	5488.9148	5586.0815	7362.0548	12307.96	21068.145	21068.145	21068.145	21068.145	21068.145	F11
380	F12_NEGAS	147.17949	147.17949	147.17949	420.51282	420.51282	420.51282	420.51282	420.51282	420.51282	420.51282	420.51282	420.51282	F12
381	F13_GCHIL	0	0	12.6	12.6	12.6	194.065	205.565	235.315	235.315	235.315	235.315	235.315	F13
382	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
383	F15_FLUEI	6553.1194	7509.25	14884.956	19721.995	21656.434	26212.478	26212.478	26212.478	26212.478	26212.478	26212.478	26212.478	F15
384	F16_DUCT	80781.733	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	F16
385	F17_HEEAC	1032.325	1032.325	1032.325	1032.325	1032.325	1032.325	1032.325	2949.5	2949.5	2949.5	2949.5	2949.5	F17
386	F18_EMCS	74393.757	74645.674	78200.662	85005.604	93295.868	103410.84	155768.72	209098.08	209098.08	209098.08	209098.08	209098.08	F18
387	F19_GHP	7236.1667	7236.1667	7236.1667	7948.1333	11887.567	12181.058	17487.533	17564.667	17564.667	17564.667	17564.667	17564.667	F19
388	F20_RADBR	6090660	6090660	6812220	6812220	9614670	10885590	17399370	20302200	20302200	20302200	20302200	20302200	F20
389	F21_SHADD	384293.81	384293.81	384293.81	384293.81	618473.38	669528.91	841551.17	1280979.4	1280979.4	1280979.4	1280979.4	1280979.4	F21
390	F22_RROOF	6394230	11806920	14475330	20066760	27504160	29157930	33353730	36010800	36010800	36010800	36010800	36010800	F22
391	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
392	F24_BINSL	13953940	13953940	13953940	14566858	16067023	17859112	20650750	25370800	25370800	25370800	25370800	25370800	F24
393	F25_CINSL	25079925	25768388	28192513	29502613	31232225	33055200	34114363	34593000	34593000	34593000	34593000	34593000	F25
394	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
395	F27_WINDF	647243.02	1066050.2	1896443.2	2140688.5	2965181.5	3512616.3	3549319.1	3698531.5	3698531.5	3698531.5	3698531.5	3698531.5	F27
396	F28_WHBLA	92773.017	100598.4	100598.4	100623.5	100623.5	100623.5	100623.5	100623.5	100623.5	100623.5	100623.5	100623.5	F28
397	F29_HWHP	891.4	1001.5333	1001.5333	2926.5333	2926.5333	2926.5333	2926.5333	2971.3333	2971.3333	2971.3333	2971.3333	2971.3333	F29
398	F30_[illegible]REST	8852[illegible].667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	88526.667	F30
39[illegible]	F31_FREST	265580	265580	265580	265580	265580	265580	265580	265580	265580	265580	265580	265580	F31
400	F32_DESUP	2713.5996	15250.88	31488.173	44065.493	54037.973	63790.933	66220.027	66254	66254	66254	66254	66254	F32
401	F33_IHWH	1291.6	1291.6	1677.1833	1677.1833	4305.3333	4305.3333	4305.3333	4305.3333	4305.3333	4305.3333	4305.3333	4305.3333	F33
402	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
403	F35_HDISR	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	279.9195	F35
404	F36_MSUMP	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	1006.326	F36
405	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
406	F38_WINDE	97.13751	97.13751	97.13751	97.13751	97.13751	97.13751	129.90578	323.7917	323.7917	323.7917	323.7917	323.7917	F38
407	F39_MICCM	42657.76	65794.92	68492.093	68492.093	68492.093	71002.52	71002.52	72640	72640	72640	72640	72640	F39
408	F40_SOLSL	1299.92	1299.92	7284.78	9667.16	20985.18	34009.38	49071.98	64996	64996	64996	64996	64996	F40
409	F41_SOLWH	290.73333	290.73333	290.73333	432.33333	432.33333	2907.3333	2907.3333	2907.3333	2907.3333	2907.3333	2907.3333	2907.3333	F41
410	F42_SOLWL	4980.096	4980.096	4980.096	4980.096	31560.2	89974.17	174812.22	332006.4	332006.4	332006.4	332006.4	332006.4	F42
411	F43_SOLWB	6.1096491	6.1096491	6.1096491	6.1096491	6.1096491	6.1096491	6.1096491	61.096491	61.096491	61.096491	61.096491	61.096491	F43
412	F44_RFRIG	2361.3	2892.8333	4167.8333	5721.35	9423.1	11294.8	12282.217	15742	15742	15742	15742	15742	F44
413	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 10 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
414	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
415	F47_DCONP	1941.1272	1941.1272	3334.6346	5877.6942	7550.4861	11520.582	12617.857	12940.848	12940.848	12940.848	12940.848	12940.848	F47
416	F48_VHTRR	442.46321	442.46321	601.20443	877.97046	1670.7024	2275.8521	2574.5714	4424.6321	4424.6321	4424.6321	4424.6321	4424.6321	F48
417	F49_SMOTR	28078.444	47444.222	69244.228	79117.111	101277.11	108919.33	108919.33	111745.56	111745.56	111745.56	111745.56	111745.56	F49
418	F50_MMOTR	8129.8222	14752.933	20255.422	21745.111	21783.867	22349.111	22349.111	22349.111	22349.111	22349.111	22349.111	22349.111	F50
419	F51_LMOTR	1625.9644	2950.5867	4051.0844	4349.0222	4356.7733	4469.8222	4469.8222	4469.8222	4469.8222	4469.8222	4469.8222	4469.8222	F51
420	F52_SVSD	279.5	279.5	279.5	279.5	279.5	1026.225	1026.225	1863.3333	1863.3333	1863.3333	1863.3333	1863.3333	F52
421	F53_MVSD	119.475	119.475	119.475	119.475	268.82	268.82	599.81	796.5	796.5	796.5	796.5	796.5	F53
422	F54_LVSD	119.475	119.475	119.475	119.475	268.82	268.82	599.81	796.5	796.5	796.5	796.5	795.5	F54
423														
424														
425		Cumulative quantity penetration by ECO above the fy93 penetration												
426	P2	(do not copy downward, can copy across)												
427		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
428	F01_2X4FL	174692	502764.58	754757.5	1009850.1	1097259.3	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6	1123528.6	F01
429	F02_COMFL	1269637.8	1269637.8	1269637.8	1269637.8	1269637.8	1269637.8	1269637.8	1320012.8	1320012.8	1320012.8	1320012.8	1320012.8	F02
430	F03_EXLIT	41858.85	96755.45	110628.1	110628.1	110628.1	110628.1	110628.1	110628.1	110628.1	110628.1	110628.1	110628.1	F03
431	F04_OCSEN	11739.15	29068.1	35702.9	45438.5	67669.45	88983.65	106320.2	110740.55	110740.55	110740.55	110740.55	110740.55	F04
432	F05_SLAMP	10190.25	37419.136	106316.8	118796.52	146427.75	148123.02	148123.02	171212.52	171212.52	171212.52	171212.52	171212.52	F05
433	F06_OLTCN	26009.194	36575.156	67038.469	76179.206	96345.094	98956.975	100057.54	102014.61	102014.61	102014.61	102014.61	102014.61	F06
434	F07_CONLL	0	0	0	9604.5833	9604.5833	18310.833	24450.417	38925.833	38925.833	38925.833	38925.833	38925.833	F07
435	F08_PTHRM	14656.8	53376.833	59472.983	63582.55	64274.367	64274.367	64274.367	64274.367	64274.367	64274.367	64274.367	64274.367	F08
436	F09_MBOIL	0	0	126.58223	407.94209	726.93097	992.33763	1461.7574	2926.2958	2926.2958	2926.2958	2926.2958	2926.2958	F09
437	F10_CLOLS	0	0	11987.164	17522.679	20577.793	38258.936	84957.879	127056.02	127056.02	127056.02	127056.02	127056.02	F10
438	F11_HEGAS	0	0	1476.0433	2328.6931	2427.8597	4201.8331	9147.7361	17907.923	17907.923	17907.923	17907.923	17907.923	F11
439	F12_NEGAS	0	0	0	273.33333	273.33333	273.33333	273.33333	273.33333	273.33333	273.33333	273.33333	273.33333	F12
440	F13_GCHIL	0	0	12.6	12.6	12.6	194.065	205.565	235.315	235.315	235.315	235.315	235.315	F13
441	F14_GSHP	0	0	0	0	0	0	0	0	0	0	0	0	F14
442	F15_FLUEI	0	956.13057	8331.8366	13168.876	15103.315	19659.358	19659.358	19659.358	19659.358	19659.358	19659.358	19659.358	F15
443	F16_DUCT	58436.9	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	64181.833	F16
444	F17_HEEAC	0	0	0	0	0	0	0	1917.175	1917.175	1917.175	1917.175	1917.175	F17
445	F18_EMCS	1209.4285	1461.3451	5016.3332	11821.275	20111.539	30226.507	82584.395	135913.75	135913.75	135913.75	135913.75	135913.75	F18
446	F19_GHP	0	0	0	711.96667	4651.4	4944.891	10251.367	10328.5	10328.5	10328.5	10328.5	10328.5	F19
447	F20_RADBR	0	0	721560	721560	3524010	4794930	11308710	14211540	14211540	14211540	14211540	14211540	F20
448	F21_SHADD	0	0	0	0	234179.57	285235.1	457257.36	896685.55	896685.55	896685.55	896685.55	896685.55	F21
449	F22_RROOF	2793150	8205840	10874250	16465680	23903100	25556850	29752650	32409720	32409720	32409720	32409720	32409720	F22
450	F23_EINSL	0	0	0	0	0	0	0	0	0	0	0	0	F23
451	F24_BINSL	0	0	0	612918	2113083	3905172	6696810	11416860	11416860	11416860	11416860	11416860	F24
452	F25_CINSL	0	688462.5	3112587.5	4422687.5	6152300	7975275	9034437.5	9513075	9513075	9513075	9513075	9513075	F25
453	F26_SWIND	0	0	0	0	0	0	0	0	0	0	0	0	F26
454	F27_WINDF	0	418807.22	1249200.2	1493445.5	2317938.5	2865373.2	2902076.1	3051288.5	3051288.5	3051288.5	3051288.5	3051288.5	F27
455	F28_WHBLA	39945.679	47771.067	47771.067	47796.162	47796.162	47796.162	47796.162	47796.162	47796.162	47796.162	47796.162	47796.162	F28
456	F29_HWHP	0	110.13333	110.13333	2035.1333	2035.1333	2035.1333	2035.1333	2079.9333	2079.9333	2079.9333	2079.9333	2079.9333	F29
457	F30_SREST	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	48689.667	F30
458	F31_FREST	146069	146069	146069	146069	146069	146069	146069	146069	146069	146069	146069	146069	F31
459	F32_DESUP	1388.5196	13925.8	30163.093	42740.413	52712.993	62465.853	64894.947	64928.92	64928.92	64928.92	64928.92	64928.92	F32

Table E-3. Core Main (Linking) Spreadsheet - Value View (page 11 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
460	F33_IHWH	0	0	365.58333	365.58333	3013.7333	3013.7333	3013.7333	3013.7333	3013.7333	3013.7333	3013.7333	3013.7333	F33
461	F34_TRANF	0	0	0	0	0	0	0	0	0	0	0	0	F34
462	F35_HDISR	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	139.95975	F35
463	F36_MSUMP	503.163	503.163	503.163	503.163	503.163	503.163	503.163	503.163	503.163	503.163	503.163	503.163	F36
464	F37_PV	0	0	0	0	0	0	0	0	0	0	0	0	F37
465	F38_WINDE	0	0	0	0	0	0	32.768271	226.65419	226.65419	226.65419	226.65419	226.65419	F38
466	F39_M[illegible]CM	38299.36	61436.52	64133.693	64133.693	64133.693	66644.12	66644.12	68281.6	68281.6	68281.6	68281.6	68281.6	F39
467	F40_SOLSL	0	0	5984.86	8367.24	19685.26	32709.46	47772.06	63696.08	63696.08	63696.08	63696.08	63696.08	F40
468	F41_SOLWH	0	0	0	141.6	141.6	2616.6	2616.6	2616.6	2616.6	2616.6	2616.6	2616.6	F41
469	F42_SOLWL	0	0	0	0	26680.104	84994.074	169832.12	327026.3	327026.3	327026.3	327026.3	327026.3	F42
470	F43_SOLWB	0	0	0	0	0	0	0	54.986842	54.986842	54.986842	54.986842	54.986842	F43
471	F44_RFRIG	0	531.53333	1806.5333	3360.05	7061.8	8933.5	9920.9167	13380.7	13380.7	13380.7	13380.7	13380.7	F44
472	F45_ECOMP	0	0	0	0	0	0	0	0	0	0	0	0	F45
473	F46_EHP	0	0	0	0	0	0	0	0	0	0	0	0	F46
474	F47_DCONP	0	0	1393.5074	3936.567	5609.3589	9579.4544	10676.73	10999.721	10999.721	10999.721	10999.721	10999.721	F47
475	F48_VHTRR	0	0	158.74122	435.50725	1228.2392	1833.3888	2132.1082	3982.1689	3982.1689	3982.1689	3982.1689	3982.1689	F48
476	F49_SMOTR	5729.3333	25095.111	46895.117	56768	78928	86570.222	86570.222	89396.445	89396.445	89396.445	89396.445	89396.445	F49
477	F50_MMOTR	3660	10283.111	15785.8	17275.289	17314.044	17879.289	17879.289	17879.289	17879.289	17879.289	17879.289	17879.289	F50
478	F51_LMOTR	732	2056.6222	3157.12	3455.0578	3462.8089	3575.8578	3575.8578	3575.8578	3575.8578	3575.8578	3575.8578	3575.8578	F51
479	F52_SVSD	0	0	0	0	0	746.725	746.725	1583.8333	1583.8333	1583.8333	1583.8333	1583.8333	F52
480	F53_MVSD	0	0	0	0	149.345	149.345	480.335	677.025	677.025	677.025	677.025	677.025	F53
481	F54_LVSD	0	0	0	0	149.345	149.345	480.335	677.025	677.025	677.025	677.025	677.025	F54
482														
483														
484		**Percent of Final Penetration**												
485		Cum quant pen (above 93 pen) divided by last year cum quant pen (above 93 pen)												
486	P3	(do not copy downward, can copy across)												
487		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
488	F01_2X4FL	16%	45%	67%	90%	98%	100%	100%	100%	100%	100%	100%	100%	F01
489	F02_COMFL	96%	96%	96%	96%	96%	96%	96%	100%	100%	100%	100%	100%	F02
490	F03_EXLIT	38%	87%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F03
491	F04_OCSEN	11%	26%	32%	41%	61%	80%	96%	100%	100%	100%	100%	100%	F04
492	F05_SLAMP	6%	22%	62%	69%	86%	87%	87%	100%	100%	100%	100%	100%	F05
493	F06_OLTCN	25%	36%	66%	75%	94%	97%	98%	100%	100%	100%	100%	100%	F06
494	F07_CONLL	0%	0%	0%	25%	25%	47%	63%	100%	100%	100%	100%	100%	F07
495	F08_PTHRM	23%	83%	93%	99%	100%	100%	100%	100%	100%	100%	100%	100%	F08
496	F09_MBOIL	0%	0%	4%	14%	25%	34%	50%	100%	100%	100%	100%	100%	F09
497	F10_COOLS	0%	0%	9%	14%	16%	30%	67%	100%	100%	100%	100%	100%	F10
498	F11_HEGAS	0%	0%	8%	13%	14%	23%	51%	100%	100%	100%	100%	100%	F11
499	F12_NEGAS	0%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F12
500	F13_GCHIL	0%	0%	5%	5%	5%	82%	87%	100%	100%	100%	100%	100%	F13
501	F14_GSHP	na	na	na	na	na	na	na	na	na	na	na	na	F14
502	F15_FLUEI	0%	5%	42%	67%	77%	100%	100%	100%	100%	100%	100%	100%	F15
503	F16_DUCT	88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F16
504	F17_HEEAC	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	F17
505	F18_EMCS	1%	1%	4%	9%	15%	22%	61%	100%	100%	100%	100%	100%	F18

Table E-3. Core Main (Linking) Spreadsheet - Value View
(page 12 of 12 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
506	F19_GHP	0%	0%	0%	7%	45%	48%	99%	100%	100%	100%	100%	100%	F19
507	F20_RADBR	0%	0%	5%	5%	25%	34%	80%	100%	100%	100%	100%	100%	F20
508	F21_SHADD	0%	0%	0%	0%	26%	32%	51%	100%	100%	100%	100%	100%	F21
509	F22_RROOF	9%	25%	34%	51%	74%	79%	92%	100%	100%	100%	100%	100%	F22
510	F23_EINSL	na	na	na	na	na	na	na	na	na	na	na	na	F23
511	F24_BINSL	0%	0%	0%	5%	19%	34%	59%	100%	100%	100%	100%	100%	F24
512	F25_CINSL	0%	7%	33%	46%	65%	84%	95%	100%	100%	100%	100%	100%	F25
513	F26_SWIND	na	na	na	na	na	na	na	na	na	na	na	na	F26
514	F27_WINDF	0%	14%	41%	49%	76%	94%	95%	100%	100%	100%	100%	100%	F27
515	F28_WHBLA	84%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F28
516	F29_HWHP	0%	5%	5%	98%	98%	98%	98%	100%	100%	100%	100%	100%	F29
517	F30_SREST	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F30
518	F31_FREST	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F31
519	F32_DESUP	2%	21%	46%	66%	81%	96%	100%	100%	100%	100%	100%	100%	F32
520	F33_IHWH	0%	0%	13%	13%	100%	100%	100%	100%	100%	100%	100%	100%	F33
521	F34_TRANF	na	na	na	na	na	na	na	na	na	na	na	na	F34
522	F35_HDISR	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F35
523	F36_MSUMP	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	F36
524	F37_PV	na	na	na	na	na	na	na	na	na	na	na	na	F37
525	F38_WIND	0%	0%	0%	0%	0%	0%	14%	100%	100%	100%	100%	100%	F38
526	F39_MICCM	56%	90%	94%	94%	94%	98%	98%	100%	100%	100%	100%	100%	F39
527	F40_SOLSL	0%	0%	9%	13%	31%	51%	75%	100%	100%	100%	100%	100%	F40
528	F41_SOLWH	0%	0%	0%	5%	5%	100%	100%	100%	100%	100%	100%	100%	F41
529	F42_SOLWL	0%	0%	0%	0%	8%	26%	52%	100%	100%	100%	100%	100%	F42
530	F43_SOLWB	0%	0%	0%	0%	0%	0%	0%	100%	100%	100%	100%	100%	F43
531	F44_RFRIG	0%	4%	14%	25%	53%	67%	74%	100%	100%	100%	100%	100%	F44
532	F45_ECOMP	na	na	na	na	na	na	na	na	na	na	na	na	F45
533	F46_EHP	na	na	na	na	na	na	na	na	na	na	na	na	F46
534	F47_DCONP	0%	0%	13%	36%	51%	87%	97%	100%	100%	100%	100%	100%	F47
535	F48_VHTRR	0%	0%	4%	11%	31%	46%	54%	100%	100%	100%	100%	100%	F48
536	F49_SMOTR	6%	28%	52%	64%	86%	97%	97%	100%	100%	100%	100%	100%	F49
537	F50_MMOTR	20%	58%	88%	97%	97%	100%	100%	100%	100%	100%	100%	100%	F50
538	F51_LMOTR	20%	58%	88%	97%	97%	100%	100%	100%	100%	100%	100%	100%	F51
539	F52_SVSD	0%	0%	0%	0%	0%	47%	47%	100%	100%	100%	100%	100%	F52
540	F53_MVSD	0%	0%	0%	0%	22%	22%	71%	100%	100%	100%	100%	100%	F53
541	F54_LVSD	0%	0%	0%	0%	22%	22%	71%	100%	100%	100%	100%	100%	F54

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 1 of 12 pages)

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8		DATA			
9					
10		Fraction [0,1] for cost savings rolled over			
11		0			
12		Annual investment funding limitations (Budget) in 1000s of dollars			
13		fy94	fy95	fy96	fy97
14	Budget	0	0	0	0
15					
16		Weights for Objectives			
17		ES	DS	CS	EnvirS
18		0	0	0	0
19					
20					
21		LOGIC			
22		Multiple Objective Function			
23		(variables with zero coeff removed)			
24		=D18*B42+E18*B47			
25					
26		Total annual investment costs			
27		=SUM(B64:B117)	=SUM(C64:C117)	=SUM(D64:D117)	=SUM(E64:E117)
28					
29		Total annual energy savings			
30		=SUM(B125:B178)	=SUM(C125:C178)	=SUM(D125:D178)	=SUM(E125:E178)
31		Grand total energy savings (1000s of MBtus)			
32		=SUM(B30:M30)			
33					
34		Total annual demand savings			
35		=SUM(B186:B239)	=SUM(C186:C239)	=SUM(D186:D239)	=SUM(E186:E239)
36		Grand total demand savings (kilowatts)			
37		=SUM(B35:M35)			
38					
39		Total annual cost savings			
40		=SUM(B247:B300)	=SUM(C247:C300)	=SUM(D247:D300)	=SUM(E247:E300)
41		Grand total costs savings (1000s of dollars)			
42		=SUM(B40:M40)			
43					
44		Total annual environmental savings			
45		=SUM(B308:B361)	=SUM(C308:C361)	=SUM(D308:D361)	=SUM(E308:E361)

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 2 of 12 pages)

	A	B	C	D	E
46		Grand total environmental savings (stone)			
47		=SUM(B45:M45)			
48					
49		Annual budget + cost savings rolled over from previous year			
50		fy94	fy95	fy96	fy97
51		see budget	=C14+$B11*B40	=D14+$B11*C40	=E14+$B11*D40
52					
53		Enforcement of cost limit			
54		unused amount shown			
55		fy94	fy95	fy96	fy97
56		=B14-B27	=C51-C27	=D51-D27	=E51-E27
57					
58					
59		LINKS (Refs to other spreadsheets)			
60					
61		Total annual investment costs by ECO			
62		(do not copy down, can copy across)			
63		fy94	fy95	fy96	fy97
64	F01_2X4FL	='C-540:r22F01'!B$302	='C-540:r22F01'!C$302	='C-540:r22F01'!D$302	='C-540:r22F01'!E$302
65	F02_COMFL	='C-540:r22F02'!B$302	='C-540:r22F02'!C$302	='C-540:r22F02'!D$302	='C-540:r22F02'!E$302
66	F03_EXLIT	='C-540:r22F03'!B$302	='C-540:r22F03'!C$302	='C-540:r22F03'!D$302	='C-540:r22F03'!E$302
67	F04_OCSEN	='C-540:r22F04'!B$302	='C-540:r22F04'!C$302	='C-540:r22F04'!D$302	='C-540:r22F04'!E$302
68	F05_SLAMP	='C-540:r22F05'!B$302	='C-540:r22F05'!C$302	='C-540:r22F05'!D$302	='C-540:r22F05'!E$302
69	F06_OLTCN	='C-540:r22F06'!B$302	='C-540:r22F06'!C$302	='C-540:r22F06'!D$302	='C-540:r22F06'!E$302
70	F07_CONLL	='C-540:r22F07'!B$302	='C-540:r22F07'!C$302	='C-540:r22F07'!D$302	='C-540:r22F07'!E$302
71	F08_PTHRM	='C-540:r22F08'!B$302	='C-540:r22F08'!C$302	='C-540:r22F08'!D$302	='C-540:r22F08'!E$302
72	F09_MBOIL	='C-540:r22F09'!B$302	='C-540:r22F09'!C$302	='C-540:r22F09'!D$302	='C-540:r22F09'!E$302
73	F10_COOLS	='C-540:r22F10'!B$302	='C-540:r22F10'!C$302	='C-540:r22F10'!D$302	='C-540:r22F10'!E$302
74	F11_HEGAS	='C-540:r22F11'!B$302	='C-540:r22F11'!C$302	='C-540:r22F11'!D$302	='C-540:r22F11'!E$302
75	F12_NEGAS	='C-540:r22F12'!B$302	='C-540:r22F12'!C$302	='C-540:r22F12'!D$302	='C-540:r22F12'!E$302
76	F13_GCHIL	='C-540:r22F13'!B$302	='C-540:r22F13'!C$302	='C-540:r22F13'!D$302	='C-540:r22F13'!E$302
77	F14_GSHP	='C-540:r22F14'!B$302	='C-540:r22F14'!C$302	='C-540:r22F14'!D$302	='C-540:r22F14'!E$302
78	F15_FLUEI	='C-540:r22F15'!B$302	='C-540:r22F15'!C$302	='C-540:r22F15'!D$302	='C-540:r22F15'!E$302
79	F16_DUCT	='C-540:r22F16'!B$302	='C-540:r22F16'!C$302	='C-540:r22F16'!D$302	='C-540:r22F16'!E$302
80	F17_HEEAC	='C-540:r22F17'!B$302	='C-540:r22F17'!C$302	='C-540:r22F17'!D$302	='C-540:r22F17'!E$302
81	F18_EMCS	='C-540:r22F18'!B$302	='C-540:r22F18'!C$302	='C-540:r22F18'!D$302	='C-540:r22F18'!E$302
82	F19_GHP	='C-540:r22F19'!B$302	='C-540:r22F19'!C$302	='C-540:r22F19'!D$302	='C-540:r22F19'!E$302
83	F20_RADBR	='C-540:r22F20'!B$302	='C-540:r22F20'!C$302	='C-540:r22F20'!D$302	='C-540:r22F20'!E$302
84	F21_SHADD	='C-540:r22F21'!B$302	='C-540:r22F21'!C$302	='C-540:r22F21'!D$302	='C-540:r22F21'!E$302
85	F22_RROOF	='C-540:r22F22'!B$302	='C-540:r22F22'!C$302	='C-540:r22F22'!D$302	='C-540:r22F22'!E$302
86	F23_EINSL	='C-540:r22F23'!B$302	='C-540:r22F23'!C$302	='C-540:r22F23'!D$302	='C-540:r22F23'!E$302
87	F24_BINSL	='C-540:r22F24'!B$302	='C-540:r22F24'!C$302	='C-540:r22F24'!D$302	='C-540:r22F24'!E$302
88	F25_CINSL	='C-540:r22F25'!B$302	='C-540:r22F25'!C$302	='C-540:r22F25'!D$302	='C-540:r22F25'!E$302
89	F26_SWIND	='C-540:r22F26'!B$302	='C-540:r22F26'!C$302	='C-540:r22F26'!D$302	='C-540:r22F26'!E$302
90	F27_WINDF	='C-540:r22F27'!B$302	='C-540:r22F27'!C$302	='C-540:r22F27'!D$302	='C-540:r22F27'!E$302
91	F28_WHBLA	='C-540:r22F28'!B$302	='C-540:r22F28'!C$302	='C-540:r22F28'!D$302	='C-540:r22F28'!E$302

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 3 of 12 pages)

	A	B	C	D	E
92	F29_HWHP	='C-540:r2'.F29'!B$302	='C-540:r22F29'!C$302	='C-540:r22F29'!D$302	='C-540:r22F29'!E$302
93	F30_SREST	='C-540:r22F30'!B$302	='C-540:r22F30'!C$302	='C-540:r22F30'!D$302	='C-540:r22F30'!E$302
94	F31_FREST	='C-540:r22F31'!B$302	='C-540:r22F31'!C$302	='C-540:r22F31'!D$302	='C-540:r22F31'!E$302
95	F32_DESUP	='C-540:r22F32'!B$302	='C-540:r22F32'!C$302	='C-540:r22F32'!D$302	='C-540:r22F32'!E$302
96	F33_IHWH	='C-540:r22F33'!B$302	='C-540:r22F33'!C$302	='C-540:r22F33'!D$302	='C-540:r22F33'!E$302
97	F34_TRANF	='C-540:r22F34'!B$302	='C-540:r22F34'!C$302	='C-540:r22F34'!D$302	='C-540:r22F34'!E$302
98	F35_HDISR	='C-540:r22F35'!B$302	='C-540:r22F35'!C$302	='C-540:r22F35'!D$302	='C-540:r22F35'!E$302
99	F36_MSUMP	='C-540:r22F36'!B$302	='C-540:r22F36'!C$302	='C-540:r22F36'!D$302	='C-540:r22F36'!E$302
100	F37_PV	='C-540:r22F37'!B$302	='C-540:r22F37'!C$302	='C-540:r22F37'!D$302	='C-540:r22F37'!E$302
101	F38_WINDE	='C-540:r22F38'!B$302	='C-540:r22F38'!C$302	='C-540:r22F38'!D$302	='C-540:r22F38'!E$302
102	F39_MICCM	='C-540:r22F39'!B$302	='C-540:r22F39'!C$302	='C-540:r22F39'!D$302	='C-540:r22F39'!E$302
103	F40_SOLSL	='C-540:r22F40'!B$302	='C-540:r22F40'!C$302	='C-540:r22F40'!D$302	='C-540:r22F40'!E$302
104	F41_SOLWH	='C-540:r22F41'!B$302	='C-540:r22F41'!C$302	='C-540:r22F41'!D$302	='C-540:r22F41'!E$302
105	F42_SOLWL	='C-540:r22F42'!B$302	='C-540:r22F42'!C$302	='C-540:r22F42'!D$302	='C-540:r22F42'!E$302
106	F43_SOLWB	='C-540:r22F43'!B$302	='C-540:r22F43'!C$302	='C-540:r22F43'!D$302	='C-540:r22F43'!E$302
107	F44_RFRIG	='C-540:r22F44'!B$302	='C-540:r22F44'!C$302	='C-540:r22F44'!D$302	='C-540:r22F44'!E$302
108	F45_ECOMP	='C-540:r22F45'!B$302	='C-540:r22F45'!C$302	='C-540:r22F45'!D$302	='C-540:r22F45'!E$302
109	F46_EHP	='C-540:r22F46'!B$302	='C-540:r22F46'!C$302	='C-540:r22F46'!D$302	='C-540:r22F46'!E$302
110	F47_DCONP	='C-540:r22F47'!B$302	='C-540:r22F47'!C$302	='C-540:r22F47'!D$302	='C-540:r22F47'!E$302
111	F48_VHTRR	='C-540:r22F48'!B$302	='C-540:r22F48'!C$302	='C-540:r22F48'!D$302	='C-540:r22F48'!E$302
112	F49_SMOTR	='C-540:r22F49'!B$302	='C-540:r22F49'!C$302	='C-540:r22F49'!D$302	='C-540:r22F49'!E$302
113	F50_MMOTR	='C-540:r22F50'!B$302	='C-540:r22F50'!C$302	='C-540:r22F50'!D$302	='C-540:r22F50'!E$302
114	F51_LMOTR	='C-540:r22F51'!B$302	='C-540:r22F51'!C$302	='C-540:r22F51'!D$302	='C-540:r22F51'!E$302
115	F52_SVSD	='C-540:r22F52'!B$302	='C-540:r22F52'!C$302	='C-540:r22F52'!D$302	='C-540:r22F52'!E$302
116	F53_MVSD	='C-540:r22F53'!B$302	='C-540:r22F53'!C$302	='C-540:r22F53'!D$302	='C-540:r22F53'!E$302
117	F54_LVSD	='C-540:r22F54'!B$302	='C-540:r22F54'!C$302	='C-540:r22F54'!D$302	='C-540:r22F54'!E$302
118					
119					
120					
121					
122		Total annual energy savings by ECO			
123		(do not copy downward, can copy across)			
124		fy94	fy95	fy96	fy97
125	F01_2X4FL	='C-540:r22F01'!B$362	='C-540:r22F01'!C$362	='C-540:r22F01'!D$362	='C-540:r22F01'!E$362
126	F02_COMFL	='C-540:r22F02'!B$362	='C-540:r22F02'!C$362	='C-540:r22F02'!D$362	='C-540:r22F02'!E$362
127	F03_EXLIT	='C-540:r22F03'!B$362	='C-540:r22F03'!C$362	='C-540:r22F03'!D$362	='C-540:r22F03'!E$362
128	F04_OCSEN	='C-540:r22F04'!B$362	='C-540:r22F04'!C$362	='C-540:r22F04'!D$362	='C-540:r22F04'!E$362
129	F05_SLAMP	='C-540:r22F05'!B$362	='C-540:r22F05'!C$362	='C-540:r22F05'!D$362	='C-540:r22F05'!E$362
130	F06_OLTCN	='C-540:r22F06'!B$362	='C-540:r22F06'!C$362	='C-540:r22F06'!D$362	='C-540:r22F06'!E$362
131	F07_CONLL	='C-540:r22F07'!B$362	='C-540:r22F07'!C$362	='C-540:r22F07'!D$362	='C-540:r22F07'!E$362
132	F08_PTHRM	='C-540:r22F08'!B$362	='C-540:r22F08'!C$362	='C-540:r22F08'!D$362	='C-540:r22F08'!E$362
133	F09_MBOIL	='C-540:r22F09'!B$362	='C-540:r22F09'!C$362	='C-540:r22F09'!D$362	='C-540:r22F09'!E$362
134	F10_COOLS	='C-540:r22F10'!B$362	='C-540:r22F10'!C$362	='C-540:r22F10'!D$362	='C-540:r22F10'!E$362
135	F11_HEGAS	='C-540:r22F11'!B$362	='C-540:r22F11'!C$362	='C-540:r22F11'!D$362	='C-540:r22F11'!E$362
136	F12_NEGAS	='C-540:r22F12'!B$362	='C-540:r22F12'!C$362	='C-540:r22F12'!D$362	='C-540:r22F12'!E$362
137	F13_GCHIL	='C-540:r22F13'!B$362	='C-540:r22F13'!C$362	='C-540:r22F13'!D$362	='C-540:r22F13'!E$362

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 4 of 12 pages)

	A	B	C	D	E
138	F14_GSHP	='C-540:r22F14'!B$362	='C-540:r22F14'!C$362	='C-540:r22F14'!D$362	='C-540:r22F14'!E$362
139	F15_FLUEI	='C-540:r22F15'!B$362	='C-540:r22F15'!C$362	='C-540:r22F15'!D$362	='C-540:r22F15'!E$362
140	F16_DUCT	='C-540:r22F16'!B$362	='C-540:r22F16'!C$362	='C-540:r22F16'!D$362	='C-540:r22F16'!E$362
141	F17_HEEAC	='C-540:r22F17'!B$362	='C-540:r22F17'!C$362	='C-540:r22F17'!D$362	='C-540:r22F17'!E$362
142	F18_EMCS	='C-540:r22F18'!B$362	='C-540:r22F18'!C$362	='C-540:r22F18'!D$362	='C-540:r22F18'!E$362
143	F19_GHP	='C-540:r22F19'!B$362	='C-540:r22F18'!C$362	='C-540:r22F19'!D$362	='C-540:r22F19'!E$362
144	F20_RADBR	='C-540:r22F20'!B$362	='C-540:r22F20'!C$362	='C-540:r22F20'!D$362	='C-540:r22F20'!E$362
145	F21_SHADD	='C-540:r22F21'!B$362	='C-540:r22F21'!C$362	='C-540:r22F21'!D$362	='C-540:r22F21'!E$362
146	F22_RROOF	='C-540:r22F22'!B$362	='C-540:r22F22'!C$362	='C-540:r22F22'!D$362	='C-540:r22F22'!E$362
147	F23_EINSL	='C-540:r22F23'!B$362	='C-540:r22F23'!C$362	='C-540:r22F23'!D$362	='C-540:r22F23'!E$362
148	F24_BINSL	='C-540:r22F24'!B$362	='C-540:r22F24'!C$362	='C-540:r22F24'!D$362	='C-540:r22F24'!E$362
149	F25_CINSL	='C-540:r22F25'!B$362	='C-540:r22F25'!C$362	='C-540:r22F25'!D$362	='C-540:r22F25'!E$362
150	F26_SWIND	='C-540:r22F26'!B$362	='C-540:r22F26'!C$362	='C-540:r22F26'!D$362	='C-540:r22F26'!E$362
151	F27_WINDF	='C-540:r22F27'!B$362	='C-540:r22F27'!C$362	='C-540:r22F27'!D$362	='C-540:r22F27'!E$362
152	F28_WHBLA	='C-540:r22F28'!B$362	='C-540:r22F28'!C$362	='C-540:r22F28'!D$362	='C-540:r22F28'!E$362
153	F29_HWHP	='C-540:r22F29'!B$362	='C-540:r22F29'!C$362	='C-540:r22F29'!D$362	='C-540:r22F29'!E$362
154	F30_SREST	='C-540:r22F30'!B$362	='C-540:r22F30'!C$362	='C-540:r22F30'!D$362	='C-540:r22F30'!E$362
155	F31_FREST	='C-540:r22F31'!B$362	='C-540:r22F31'!C$362	='C-540:r22F31'!D$362	='C-540:r22F31'!E$362
156	F32_DESUP	='C-540:r22F32'!B$362	='C-540:r22F32'!C$362	='C-540:r22F32'!D$362	='C-540:r22F32'!E$362
157	F33_IHWH	='C-540:r22F33'!B$362	='C-540:r22F33'!C$362	='C-540:r22F33'!D$362	='C-540:r22F33'!E$362
158	F34_TRANF	='C-540:r22F34'!B$362	='C-540:r22F34'!C$362	='C-540:r22F34'!D$362	='C-540:r22F34'!E$362
159	F35_HDISR	='C-540:r22F35'!B$362	='C-540:r22F35'!C$362	='C-540:r22F35'!D$362	='C-540:r22F35'!E$362
160	F36_MSUMP	='C-540:r22F36'!B$362	='C-540:r22F36'!C$362	='C-540:r22F36'!D$362	='C-540:r22F36'!E$362
161	F37_PV	='C-540:r22F37'!B$362	='C-540:r22F37'!C$362	='C-540:r22F37'!D$362	='C-540:r22F37'!E$362
162	F38_WINDE	='C-540:r22F38'!B$362	='C-540:r22F38'!C$362	='C-540:r22F38'!D$362	='C-540:r22F38'!E$362
163	F39_MICCM	='C-540:r22F39'!B$362	='C-540:r22F39'!C$362	='C-540:r22F39'!D$362	='C-540:r22F39'!E$362
164	F40_SOLSL	='C-540:r22F40'!B$362	='C-540:r22F40'!C$362	='C-540:r22F40'!D$362	='C-540:r22F40'!E$362
165	F41_SOLWH	='C-540:r22F41'!B$362	='C-540:r22F41'!C$362	='C-540:r22F41'!D$362	='C-540:r22F41'!E$362
166	F42_SOLWL	='C-540:r22F42'!B$362	='C-540:r22F42'!C$362	='C-540:r22F42'!D$362	='C-540:r22F42'!E$362
167	F43_SOLWB	='C-540:r22F43'!B$362	='C-540:r22F43'!C$362	='C-540:r22F43'!D$362	='C-540:r22F43'!E$362
168	F44_RFRIG	='C-540:r22F44'!B$362	='C-540:r22F44'!C$362	='C-540:r22F44'!D$362	='C-540:r22F44'!E$362
169	F45_ECOMP	='C-540:r22F45'!B$362	='C-540:r22F45'!C$362	='C-540:r22F45'!D$362	='C-540:r22F45'!E$362
170	F46_EHP	='C-540:r22F46'!B$362	='C-540:r22F46'!C$362	='C-540:r22F46'!D$362	='C-540:r22F46'!E$362
171	F47_DCONP	='C-540:r22F47'!B$362	='C-540:r22F47'!C$362	='C-540:r22F47'!D$362	='C-540:r22F47'!E$362
172	F48_VHTRH	='C-540:r22F48'!B$362	='C-540:r22F48'!C$362	='C-540:r22F48'!D$362	='C-540:r22F48'!E$362
173	F49_SMOTR	='C-540:r22F49'!B$362	='C-540:r22F49'!C$362	='C-540:r22F49'!D$362	='C-540:r22F49'!E$362
174	F50_MMOTR	='C-540:r22F50'!B$362	='C-540:r22F50'!C$362	='C-540:r22F50'!D$362	='C-540:r22F50'!E$362
175	F51_LMOTR	='C-540:r22F51'!B$362	='C-540:r22F51'!C$362	='C-540:r22F51'!D$362	='C-540:r22F51'!E$362
176	F52_SVSD	='C-540:r22F52'!B$362	='C-540:r22F52'!C$362	='C-540:r22F52'!D$362	='C-540:r22F52'!E$362
177	F53_MVSD	='C-540:r22F53'!B$362	='C-540:r22F53'!C$362	='C-540:r22F53'!D$362	='C-540:r22F53'!E$362
178	F54_LVSD	='C-540:r22F54'!B$362	='C-540:r22F54'!C$362	='C-540:r22F54'!D$362	='C-540:r22F54'!E$362
179					
180					
181					
182					
183		Total annual demand savings by ECO			

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 5 of 12 pages)

	A	B	C	D	E
184		(do not copy downward, can copy across)			
185		fy94	fy95	fy96	fy97
186	F01_2X4FL	='C-540:r22F01'!B$422	='C-540:r22F01'!C$422	='C-540:r22F01'!D$422	='C-540:r22F01'!E$422
187	F02_COMFL	='C-540:r22F02'!B$422	='C-540:r22F02'!C$422	='C-540:r22F02'!D$422	='C-540:r22F02'!E$422
188	F03_EXLIT	='C-540:r22F03'!B$422	='C-540:r22F03'!C$422	='C-540:r22F03'!D$422	='C-540:r22F03'!E$422
189	F04_OCSEN	='C-540:r22F04'!B$422	='C-540:r22F04'!C$422	='C-540:r22F04'!D$422	='C-540:r22F04'!E$422
190	F05_SLAMP	='C-540:r22F05'!B$422	='C-540:r22F05'!C$422	='C-540:r22F05'!D$422	='C-540:r22F05'!E$422
191	F06_OLTCN	='C-540:r22F06'!B$422	='C-540:r22F06'!C$422	='C-540:r22F06'!D$422	='C-540:r22F06'!E$422
192	F07_CONLL	='C-540:r22F07'!B$422	='C-540:r22F07'!C$422	='C-540:r22F07'!D$422	='C-540:r22F07'!E$422
193	F08_PTHRM	='C-540:r22F08'!B$422	='C-540:r22F08'!C$422	='C-540:r22F08'!D$422	='C-540:r22F08'!E$422
194	F09_MBOIL	='C-540:r22F09'!B$422	='C-540:r22F09'!C$422	='C-540:r22F09'!D$422	='C-540:r22F09'!E$422
195	F10_COOLS	='C-540:r22F10'!B$422	='C-540:r22F10'!C$422	='C-540:r22F10'!D$422	='C-540:r22F10'!E$422
196	F11_HEGAS	='C-540:r22F11'!B$422	='C-540:r22F11'!C$422	='C-540:r22F11'!D$422	='C-540:r22F11'!E$422
197	F12_NEGAS	='C-540:r22F12'!B$422	='C-540:r22F12'!C$422	='C-540:r22F12'!D$422	='C-540:r22F12'!E$422
198	F13_GCHIL	='C-540:r22F13'!B$422	='C-540:r22F13'!C$422	='C-540:r22F13'!D$422	='C-540:r22F13'!E$422
199	F14_GSHP	='C-540:r22F14'!B$422	='C-540:r22F14'!C$422	='C-540:r22F14'!D$422	='C-540:r22F14'!E$422
200	F15_FLUEI	='C-540:r22F15'!B$422	='C-540:r22F15'!C$422	='C-540:r22F15'!D$422	='C-540:r22F15'!E$422
201	F16_DUCT	='C-540:r22F16'!B$422	='C-540:r22F16'!C$422	='C-540:r22F16'!D$422	='C-540:r22F16'!E$422
202	F17_HEEAC	='C-540:r22F17'!B$422	='C-540:r22F17'!C$422	='C-540:r22F17'!D$422	='C-540:r22F17'!E$422
203	F18_EMCS	='C-540:r22F18'!B$422	='C-540:r22F18'!C$422	='C-540:r22F18'!D$422	='C-540:r22F18'!E$422
204	F19_GHP	='C-540:r22F19'!B$422	='C-540:r22F19'!C$422	='C-540:r22F19'!D$422	='C-540:r22F19'!E$422
205	F20_RADBR	='C-540:r22F20'!B$422	='C-540:r22F20'!C$422	='C-540:r22F20'!D$422	='C-540:r22F20'!E$422
206	F21_SHADD	='C-540:r22F21'!B$422	='C-540:r22F21'!C$422	='C-540:r22F21'!D$422	='C-540:r22F21'!E$422
207	F22_RROOF	='C-540:r22F22'!B$422	='C-540:r22F22'!C$422	='C-540:r22F22'!D$422	='C-540:r22F22'!E$422
208	F23_EINSL	='C-540:r22F23'!B$422	='C-540:r22F23'!C$422	='C-540:r22F23'!D$422	='C-540:r22F23'!E$422
209	F24_BINSL	='C-540:r22F24'!B$422	='C-540:r22F24'!C$422	='C-540:r22F24'!D$422	='C-540:r22F24'!E$422
210	F25_CINSL	='C-540:r22F25'!B$422	='C-540:r22F25'!C$422	='C-540:r22F25'!D$422	='C-540:r22F25'!E$422
211	F26_SWIND	='C-540:r22F26'!B$422	='C-540:r22F26'!C$422	='C-540:r22F26'!D$422	='C-540:r22F26'!E$422
212	F27_WINDF	='C-540:r22F27'!B$422	='C-540:r22F27'!C$422	='C-540:r22F27'!D$422	='C-540:r22F27'!E$422
213	F28_WHBLA	='C-540:r22F28'!B$422	='C-540:r22F28'!C$422	='C-540:r22F28'!D$422	='C-540:r22F28'!E$422
214	F29_HWHP	='C-540:r22F29'!B$422	='C-540:r22F29'!C$422	='C-540:r22F29'!D$422	='C-540:r22F29'!E$422
215	F30_SREST	='C-540:r22F30'!B$422	='C-540:r22F30'!C$422	='C-540:r22F30'!D$422	='C-540:r22F30'!E$422
216	F31_FREST	='C-540:r22F31'!B$422	='C-540:r22F31'!C$422	='C-540:r22F31'!D$422	='C-540:r22F31'!E$422
217	F32_DESUP	='C-540:r22F32'!B$422	='C-540:r22F32'!C$422	='C-540:r22F32'!D$422	='C-540:r22F32'!E$422
218	F33_IHWH	='C-540:r22F33'!B$422	='C-540:r22F33'!C$422	='C-540:r22F33'!D$422	='C-540:r22F33'!E$422
219	F34_TRANF	='C-540:r22F34'!B$422	='C-540:r22F34'!C$422	='C-540:r22F34'!D$422	='C-540:r22F34'!E$422
220	F35_HDISR	='C-540:r22F35'!B$422	='C-540:r22F35'!C$422	='C-540:r22F35'!D$422	='C-540:r22F35'!E$422
221	F36_MSUMP	='C-540:r22F36'!B$422	='C-540:r22F36'!C$422	='C-540:r22F36'!D$422	='C-540:r22F36'!E$422
222	F37_PV	='C-540:r22F37'!B$422	='C-540:r22F37'!C$422	='C-540:r22F37'!D$422	='C-540:r22F37'!E$422
223	F38_WINDE	='C-540:r22F38'!B$422	='C-540:r22F38'!C$422	='C-540:r22F38'!D$422	='C-540:r22F38'!E$422
224	F39_MICCM	='C-540:r22F39'!B$422	='C-540:r22F39'!C$422	='C-540:r22F39'!D$422	='C-540:r22F39'!E$422
225	F40_SOLSL	='C-540:r22F40'!B$422	='C-540:r22F40'!C$422	='C-540:r22F40'!D$422	='C-540:r22F40'!E$422
226	F41_SOLWH	='C-540:r22F41'!B$422	='C-540:r22F41'!C$422	='C-540:r22F41'!D$422	='C-540:r22F41'!E$422
227	F42_SOLWL	='C-540:r22F42'!B$422	='C-540:r22F42'!C$422	='C-540:r22F42'!D$422	='C-540:r22F42'!E$422
228	F43_SOLWB	='C-540:r22F43'!B$422	='C-540:r22F43'!C$422	='C-540:r22F43'!D$422	='C-540:r22F43'!E$422
229	F44_RFRIG	='C-540:r22F44'!B$422	='C-540:r22F44'!C$422	='C-540:r22F44'!D$422	='C-540:r22F44'!E$422

Table E-4. Core Main (Linking) Spreadsheet - Formula View
(page 6 of 12 pages)

	A	B	C	D	E
230	F45_ECOMP	='C-540:r22F45'!B$422	='C-540:r22F45'!C$422	='C-540:r22F45'!D$422	='C-540:r22F45'!E$422
231	F46_EHP	='C-540:r22F46'!B$422	='C-540:r22F46'!C$422	='C-540:r22F46'!D$422	='C-540:r22F46'!E$422
232	F47_DCONP	='C-540:r22F47'!B$422	='C-540:r22F47'!C$422	='C-540:r22F47'!D$422	='C-540:r22F47'!E$422
233	F48_VHTRR	='C-540:r22F48'!B$422	='C-540:r22F48'!C$422	='C-540:r22F48'!D$422	='C-540:r22F48'!E$422
234	F49_SMOTR	='C-540:r22F49'!B$422	='C-540:r22F49'!C$422	='C-540:r22F49'!D$422	='C-540:r22F49'!E$422
235	F50_MMOTR	='C-540:r22F50'!B$422	='C-540:r22F50'!C$422	='C-540:r22F50'!D$422	='C-540:r22F50'!E$422
236	F51_LMOTR	='C-540:r22F51'!B$422	='C-540:r22F51'!C$422	='C-540:r22F51'!D$422	='C-540:r22F51'!E$422
237	F52_SVSD	='C-540:r22F52'!B$422	='C-540:r22F52'!C$422	='C-540:r22F52'!D$422	='C-540:r22F52'!E$422
238	F53_MVSD	='C-540:r22F53'!B$422	='C-540:r22F53'!C$422	='C-540:r22F53'!D$422	='C-540:r22F53'!E$422
239	F54_LVSD	='C-540:r22F54'!B$422	='C-540:r22F54'!C$422	='C-540:r22F54'!D$422	='C-540:r22F54'!E$422
240					
241					
242					
243					
244		**Total annual cost savings by ECO**			
245		(do not copy downward, can copy across)			
246		fy94	fy95	fy96	fy97
247	F01_2X4FL	='C-540:r22F01'!B$482	='C-540:r22F01'!C$482	='C-540:r22F01'!D$432	='C-540:r22F01'!E$482
248	F02_COMFL	='C-540:r22F02'!B$482	='C-540:r22F02'!C$482	='C-540:r22F02'!D$482	='C-540:r22F02'!E$482
249	F03_EXLIT	='C-540:r22F03'!B$482	='C-540:r22F03'!C$482	='C-540:r22F03'!D$482	='C-540:r22F03'!E$482
250	F04_OCSEN	='C-540:r22F04'!B$482	='C-540:r22F04'!C$482	='C-540:r22F04'!D$482	='C-540:r22F04'!E$482
251	F05_SLAMP	='C-540:r22F05'!B$482	='C-540:r22F05'!C$482	='C-540:r22F05'!D$482	='C-540:r22F05'!E$482
252	F06_OLTCN	='C-540:r22F06'!B$482	='C-540:r22F06'!C$482	='C-540:r22F06'!D$482	='C-540:r22F06'!E$482
253	F07_CONLL	='C-540:r22F07'!B$482	='C-540:r22F07'!C$482	='C-540:r22F07'!D$482	='C-540:r22F07'!E$482
254	F08_PTHRM	='C-540:r22F08'!B$482	='C-540:r22F08'!C$482	='C-540:r22F08'!D$482	='C-540:r22F08'!E$482
255	F09_MBOIL	='C-540:r22F09'!B$482	='C-540:r22F09'!C$482	='C-540:r22F09'!D$482	='C-540:r22F09'!E$482
256	F10_COOLS	='C-540:r22F10'!B$482	='C-540:r22F10'!C$482	='C-540:r22F10'!D$482	='C-540:r22F10'!E$482
257	F11_HEGAS	='C-540:r22F11'!B$482	='C-540:r22F11'!C$482	='C-540:r22F11'!D$482	='C-540:r22F11'!E$482
258	F12_NEGAS	='C-540:r22F12'!B$482	='C-540:r22F12'!C$482	='C-540:r22F12'!D$482	='C-540:r22F12'!E$482
259	F13_GCHIL	='C-540:r22F13'!B$482	='C-540:r22F13'!C$482	='C-540:r22F13'!D$482	='C-540:r22F13'!E$482
260	F14_GSHP	='C-540:r22F14'!B$482	='C-540:r22F14'!C$482	='C-540:r22F14'!D$482	='C-540:r22F14'!E$482
261	F15_FLUEI	='C-540:r22F15'!B$482	='C-540:r22F15'!C$482	='C-540:r22F15'!D$482	='C-540:r22F15'!E$482
262	F16_DUCT	='C-540:r22F16'!B$482	='C-540:r22F16'!C$482	='C-540:r22F16'!D$482	='C-540:r22F16'!E$482
263	F17_HEEAC	='C-540:r22F17'!B$482	='C-540:r22F17'!C$482	='C-540:r22F17'!D$482	='C-540:r22F17'!E$482
264	F18_EMCS	='C-540:r22F18'!B$482	='C-540:r22F18'!C$482	='C-540:r22F18'!D$482	='C-540:r22F18'!E$482
265	F19_GHP	='C-540:r22F19'!B$482	='C-540:r22F19'!C$482	='C-540:r22F19'!D$482	='C-540:r22F19'!E$482
266	F20_RADBR	='C-540:r22F20'!B$482	='C-540:r22F20'!C$482	='C-540:r22F20'!D$482	='C-540:r22F20'!E$482
267	F21_SHADO	='C-540:r22F21'!B$482	='C-540:r22F21'!C$482	='C-540:r22F21'!D$482	='C-540:r22F21'!E$482
268	F22_RROOF	='C-540:r22F22'!B$482	='C-540:r22F22'!C$482	='C-540:r22F22'!D$482	='C-540:r22F22'!E$482
269	F23_EINSL	='C-540:r22F23'!B$482	='C-540:r22F23'!C$482	='C-540:r22F23'!D$492	='C-540:r22F23'!E$482
270	F24_BINSL	='C-540:r22F24'!B$482	='C-540:r22F24'!C$482	='C-540:r22F24'!D$482	='C-540:r22F24'!E$482
271	F25_CINSL	='C-540:r22F25'!B$482	='C-540:r22F25'!C$482	='C-540:r22F25'!D$482	='C-540:r22F25'!E$482
272	F26_SWIND	='C-540:r22F26'!B$482	='C-540:r22F26'!C$482	='C-540:r22F26'!D$482	='C-540:r22F26'!E$482
273	F27_WNDF	='C-540:r22F27'!B$482	='C-540:r22F27'!C$482	='C-540:r22F27'!D$482	='C-540:r22F27'!E$482
274	F28_WHBLA	='C-540:r22F28'!B$482	='C-540:r22F28'!C$482	='C-540:r22F28'!D$482	='C-540:r22F28'!E$482
275	F29_HWHP	='C-540:r22F29'!B$482	='C-540:r22F29'!C$482	='C-540:r22F29'!D$482	='C-540:r22F29'!E$482

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 7 of 12 pages)

	A	B	C	D	E
276	F30_SREST	='C-540:r22F30'!B$482	='C-540:r22F30'!C$482	='C-540:r22F30'!D$482	='C-540:r22F30'!E$482
277	F31_FREST	='C-540:r22F31'!B$482	='C-540:r22F31'!C$482	='C-540:r22F31'!D$482	='C-540:r22F31'!E$482
278	F32_DESUP	='C-540:r22F32'!B$482	='C-540:r22F32'!C$482	='C-540:r22F32'!D$482	='C-540:r22F32'!E$482
279	F33_IHWH	='C-540:r22F33'!B$482	='C-540:r22F33'!C$482	='C-540:r22F33'!D$482	='C-540:r22F33'!E$482
280	F34_TRANF	='C-540:r22F34'!B$482	='C-540:r22F34'!C$482	='C-540:r22F34'!D$482	='C-540:r22F34'!E$482
281	F35_HDISR	='C-540:r22F35'!B$482	='C-540:r22F35'!C$482	='C-540:r22F35'!D$482	='C-540:r22F35'!E$482
282	F36_MSUMP	='C-540:r22F36'!B$482	='C-540:r22F36'!C$482	='C-540:r22F36'!D$482	='C-540:r22F36'!E$482
283	F37_PV	='C-540:r22F37'!B$482	='C-540:r22F37'!C$482	='C-540:r22F37'!D$482	='C-540:r22F37'!E$482
284	F38_WINDE	='C-540:r22F38'!B$482	='C-540:r22F38'!C$482	='C-540:r22F38'!D$482	='C-540:r22F38'!E$482
285	F39_MICCM	='C-540:r22F39'!B$482	='C-540:r22F39'!C$482	='C-540:r22F39'!D$482	='C-540:r22F39'!E$482
286	F40_SOLSL	='C-540:r22F40'!B$482	='C-540:r22F40'!C$482	='C-540:r22F40'!D$482	='C-540:r22F40'!E$482
287	F41_SOLWH	='C-540:r22F41'!B$482	='C-540:r22F41'!C$482	='C-540:r22F41'!D$482	='C-540:r22F41'!E$482
288	F42_SOLWL	='C-540:r22F42'!B$482	='C-540:r22F42'!C$482	='C-540:r22F42'!D$482	='C-540:r22F42'!E$482
289	F43_SOLWB	='C-540:r22F43'!B$482	='C-540:r22F43'!C$482	='C-540:r22F43'!D$482	='C-540:r22F43'!E$482
290	F44_RFRIG	='C-540:r22F44'!B$482	='C-540:r22F44'!C$482	='C-540:r22F44'!D$482	='C-540:r22F44'!E$482
291	F45_ECOMP	='C-540:r22F45'!B$482	='C-540:r22F45'!C$482	='C-540:r22F45'!D$482	='C-540:r22F45'!E$482
292	F46_EHP	='C-540:r22F46'!B$482	='C-540:r22F46'!C$482	='C-540:r22F46'!D$482	='C-540:r22F46'!E$482
293	F47_DCONP	='C-540:r22F47'!B$482	='C-540:r22F47'!C$482	='C-540:r22F47'!D$482	='C-540:r22F47'!E$482
294	F48_VHTRR	='C-540:r22F48'!B$482	='C-540:r22F48'!C$482	='C-540:r22F48'!D$482	='C-540:r22F48'!E$482
295	F49_SMOTR	='C-540:r22F49'!B$482	='C-540:r22F49'!C$482	='C-540:r22F49'!D$482	='C-540:r22F49'!E$482
296	F50_MMOTR	='C-540:r22F50'!B$482	='C-540:r22F50'!C$482	='C-540:r22F50'!D$482	='C-540:r22F50'!E$482
297	F51_LMOTR	='C-540:r22F51'!B$482	='C-540:r22F51'!C$482	='C-540:r22F51'!D$482	='C-540:r22F51'!E$482
298	F52_SVSD	='C-540:r22F52'!B$482	='C-540:r22F52'!C$482	='C-540:r22F52'!D$482	='C-540:r22F52'!E$482
299	F53_MVSD	='C-540:r22F53'!B$482	='C-540:r22F53'!C$452	='C-540:r22F53'!D$482	='C-540::22F53'!E$482
300	F54_LVSD	='C-540:r22F54'!B$482	='C-540:r22F54'!C$482	='C-540:r22F54'!D$482	='C-540:r22F54'!E$482
301					
302					
303					
304					
305		Total annual environmental savings by ECO			
306		(do not copy downward, can copy across)			
307		fy94	fy95	fy96	fy97
308	F01_2X4FL	='C-540:r22F01'!B$542	='C-540:r22F01'!C$542	='C-540:r22F01'!D$542	='C-540:r22F01'!E$542
309	F02_COMFL	='C-540:r22F02'!B$542	='C-540:r22F02'!C$542	='C-540:r22F02'!D$542	='C-540:r22F02'!E$542
310	F03_EXLIT	='C-540:r22F03'!B$542	='C-540:r22F03'!C$542	='C-540:r22F03'!E$542	='C-540:r22F03'!E$542
311	F04_OCSEN	='C-540:r22F04'!B$542	='C-540:r22F04'!C$542	='C-540:r22F04'!D$542	='C-540:r22F04'!E$542
312	F05_SLAMP	='C-540:r22F05'!B$542	='C-540:r22F05'!C$542	='C-540:r22F05'!D$542	='C-540:r22F05'!E$542
313	F06_OLTCN	='C-540:r22F06'!B$542	='C-540:r22F06'!C$542	='C-540:r22F06'!D$542	='C-540:r22F06'!E$542
314	F07_CONLL	='C-540:r22F07'!B$542	='C-540:r22F07'!C$542	='C-540:r22F07'!D$542	='C-540:r22F07'!E$542
315	F08_PTHRM	='C-540:r22F08'!B$542	='C-540:r22F08'!C$542	='C-540:r22F08'!D$542	='C-540:r22F08'!E$542
316	F09_MBOIL	='C-540:r22F09'!B$542	='C-540:r22F09'!C$542	='C-540:r22F09'!D$542	='C-540:r22F09'!E$542
317	F10_COOLS	='C-540:r22F10'!B$542	='C-540:r22F10'!C$542	='C-540:r22F10'!D$542	='C-540:r22F10'!E$542
318	F11_HEGAS	='C-540:r22F11'!B$542	='C-540:r22F11'!C$542	='C-540:r22F11'!D$542	='C-540:r22F11'!E$542
319	F12_NEGAS	='C-540:r22F12'!B$542	='C-540:r22F12'!C$542	='C-540:r22F12'!D$542	='C-540:r22F12'!E$542
320	F13_GCHL	='C-540:r22F13'!B$542	='C-540:r22F13'!C$542	='C-540:r22F13'!D$542	='C-540:r22F13'!E$542
321	F14_GSHP	='C-540:r22F14'!B$542	='C-540:r22F14'!C$542	='C-540:r22F14'!D$542	='C-540:r22F14'!E$542

Table E-4. Core Main (Linking) Spreadsheet - Formula View
(page 8 of 12 pages)

	A	B	C	D	E
322	F15_FLUEI	='C-540:r22F15'!B$542	='C-540:r22F15'!C$542	='C-540:r22F15'!D$542	='C-540:r22F15'!E$542
323	F16_DUCT	='C-540:r22F16'!B$542	='C-540:r22F16'!C$542	='C-540:r22F16'!D$542	='C-540:r22F16'!E$542
324	F17_HEEAC	='C-540:r22F17'!B$542	='C-540:r22F17'!C$542	='C-540:r22F17'!D$542	='C-540:r22F17'!E$542
325	F18_EMCS	='C-540:r22F18'!B$542	='C-540:r22F18'!C$542	='C-540:r22F18'!D$542	='C-540:r22F18'!E$542
326	F19_GHP	='C-540:r22F19'!B$542	='C-540:r22F19'!C$542	='C-540:r22F19'!D$542	='C-540:r22F19'!E$542
327	F20_RADBR	='C-540:r22F20'!B$542	='C-540:r22F20'!C$542	='C-540:r22F20'!D$542	='C-540:r22F20'!E$542
328	F21_SHADD	='C-540:r22F21'!B$542	='C-540:r22F21'!C$542	='C-540:r22F21'!D$542	='C-540:r22F21'!E$542
329	F22_RROOF	='C-540:r22F22'!B$542	='C-540:r22F22'!C$542	='C-540:r22F22'!D$542	='C-540:r22F22'!E$542
330	F23_EINSL	='C-540:r22F23'!B$542	='C-540:r22F23'!C$542	='C-540:r22F23'!D$542	='C-540:r22F23'!E$542
331	F24_BINSL	='C-540:r22F24'!B$542	='C-540:r22F24'!C$542	='C-540:r22F24'!D$542	='C-540:r22F24'!E$542
332	F25_CINSL	='C-540:r22F25'!B$542	='C-540:r22F25'!C$542	='C-540:r22F25'!D$542	='C-540:r22F25'!E$542
333	F26_SWIND	='C-540:r22F26'!B$542	='C-540:r22F26'!C$542	='C-540:r22F26'!D$542	='C-540:r22F26'!E$542
334	F27_WINDF	='C-540:r22F27'!B$542	='C-540:r22F27'!C$542	='C-540:r22F27'!D$542	='C-540:r22F27'!E$542
335	F28_WHBLA	='C-540:r22F28'!B$542	='C-540:r22F28'!C$542	='C-540:r22F28'!D$542	='C-540:r22F28'!E$542
336	F29_HWHP	='C-540:r22F29'!B$542	='C-540:r22F29'!C$542	='C-540:r22F29'!D$542	='C-540:r22F29'!E$542
337	F30_SREST	='C-540:r22F30'!B$542	='C-540:r22F30'!C$542	='C-540:r22F30'!D$542	='C-540:r22F30'!E$542
338	F31_FREST	='C-540:r22F31'!B$542	='C-540:r22F31'!C$542	='C-540:r22F31'!D$542	='C-540:r22F31'!E$542
339	F32_DESUP	='C-540:r22F32'!B$542	='C-540:r22F32'!C$542	='C-540:r22F32'!D$542	='C-540:r22F32'!E$542
340	F33_IHWH	='C-540:r22F33'!B$542	='C-540:r22F33'!C$542	='C-540:r22F33'!D$542	='C-540:r22F33'!E$542
341	F34_TRANF	='C-540:r22F34'!B$542	='C-540:r22F34'!C$542	='C-540:r22F34'!D$542	='C-540:r22F34'!E$542
342	F35_HDISR	='C-540:r22F35'!B$542	='C-540:r22F35'!C$542	='C-540:r22F35'!D$542	='C-540:r22F35'!E$542
343	F36_MSUMP	='C-540:r22F36'!B$542	='C-540:r22F36'!C$542	='C-540:r22F36'!D$542	='C-540:r22F36'!E$542
344	F37_PV	='C-540:r22F37'!B$542	='C-540:r22F37'!C$542	='C-540:r22F37'!D$542	='C-540:r22F37'!E$542
345	F38_W[illegible]DE	='C-540:r[illegible]F38'!B$542	='C-540:r22F38'!C$542	='C-540:r22F38'!D$542	='C-540:r22F38'!E$542
346	F[illegible]CCM	='C-540:r22F39'!B$542	='C-540:r22F39'!C$542	='C-540:r22F39'!D$542	='C-540:r22F39'!E$542
347	F40_SOLSL	='C-540:r22F40'!B$542	='C-540:r22F40'!C$542	='C-540:r22F40'!D$542	='C-540:r22F40'!E$542
348	F41_SOLWH	='C-540:r22F41'!B$542	='C-540:r22F41'!C$542	='C-540:r22F41'!D$542	='C-540:r22F41'!E$542
349	F42_SOLWL	='C-540:r22F42'!B$542	='C-540:r22F42'!C$542	='C-540:r22F42'!D$542	='C-540:r22F42'!E$542
350	F43_SOLWB	='C-540:r22F43'!B$542	='C-540:r22F43'!C$542	='C-540:r22F43'!D$542	='C-540:r22F43'!E$542
351	F44_RFRIG	='C-540:r22F44'!B$542	='C-540:r22F44'!C$542	='C-540:r22F44'!D$542	='C-540:r22F44'!E$542
352	F45_ECOMP	='C-540:r22F45'!B$542	='C-540:r22F45'!C$542	='C-540:r22F45'!D$542	='C-540:r22F45'!E$542
353	F46_EHP	='C-540:r22F46'!B$542	='C-540:r22F46'!C$542	='C-540:r22F46'!D$542	='C-540:r22F46'!E$542
354	F47_DCONP	='C-540:r22F47'!B$542	='C-540:r22F47'!C$542	='C-540:r22F47'!D$542	='C-540:r22F47'!E$542
355	F48_VHTRR	='C-540:r22F48'!B$542	='C-540:r22F48'!C$542	='C-540:r22F48'!D$542	='C-540:r22F48'!E$542
356	F49_SMOTR	='C-540:r22F49'!B$542	='C-540:r22F49'!C$542	='C-540:r22F49'!D$542	='C-540:r22F49'!E$542
357	F50_MMOTR	='C-540:r22F50'!B$542	='C-540:r22F50'!C$542	='C-540:r22F50'!D$542	='C-540:r22F50'!E$542
358	F51_LMOTR	='C-540:r22F51'!B$542	='C-540:r22F51'!C$542	='C-540:r22F51'!D$542	='C-540:r22F51'!E$542
359	F52_SVSD	='C-540:r22F52'!B$542	='C-540:r22F52'!C$542	='C-540:r22F52'!D$542	='C-540:r22F52'!E$542
360	F53_MVSD	='C-540:r22F53'!B$542	='C-540:r22F53'!C$542	='C-540:r22F53'!D$542	='C-540:r22F53'!E$542
361	F54_LVSD	='C-540:r22F54'!B$542	='C-540:r22F54'!C$542	='C-540:r22F54'!D$542	='C-540:r22F54'!E$542
362					
363					
364		**postprocessor**			
365					
366		**Cumulative quantity penetration by ECO**			
367		(do not copy downward, can copy across)			

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 9 of 12 pages)

	A	B	C	D	E
368		fy94	fy95	fy96	fy97
369	F01_2X4FL	='C-540:r22F01'!B$685	='C-540:r22F01'!C$685	='C-540:r22F01'!D$685	='C-540:r22F01'!E$685
370	F02_COMFL	='C-540:r22F02'!B$685	='C-540:r22F02'!C$685	='C-540:r22F02'!D$685	='C-540:r22F02'!E$685
371	F03_EXLIT	='C-540:r22F03'!B$685	='C-540:r22F03'!C$685	='C-540:r22F03'!D$685	='C-540:r22F03'!E$685
372	F04_OCSEN	='C-540:r22F04'!B$685	='C-540:r22F04'!C$685	='C-540:r22F04'!D$685	='C-540:r22F04'!E$685
373	F05_SLAMP	='C-540:r22F05'!B$685	='C-540:r22F05'!C$685	='C-540:r22F05'!D$685	='C-540:r22F05'!E$685
374	F06_OLTCN	='C-540:r22F06'!B$685	='C-540:r22F06'!C$685	='C-540:r22F06'!D$685	='C-540:r22F06'!E$685
375	F07_CONLL	='C-540:r22F07'!B$685	='C-540:r22F07'!C$685	='C-540:r22F07'!D$685	='C-540:r22F07'!E$685
376	F08_PTHRM	='C-540:r22F08'!B$685	='C-540:r22F08'!C$685	='C-540:r22F08'!D$685	='C-540:r22F08'!E$685
377	F09_MBOIL	='C-540:r22F09'!B$685	='C-540:r22F09'!C$685	='C-540:r22F09'!D$685	='C-540:r22F09'!E$685
378	F10_COOLS	='C-540:r22F10'!B$685	='C-540:r22F10'!C$685	='C-540:r22F10'!D$685	='C-540:r22F10'!E$685
379	F11_HEGAS	='C-540:r22F11'!B$685	='C-540:r22F11'!C$685	='C-540:r22F11'!D$685	='C-540:r22F11'!E$685
380	F12_NEGAS	='C-540:r22F12'!B$685	='C-540:r22F12'!C$685	='C-540:r22F12'!D$685	='C-540:r22F12'!E$685
381	F13_GCHL	='C-540:r22F13'!B$685	='C-540:r22F13'!C$685	='C-540:r22F13'!D$685	='C-540:r22F13'!E$685
382	F14_GSHP	='C-540:r22F14'!B$685	='C-540:r22F14'!C$685	='C-540:r22F14'!D$685	='C-540:r22F14'!E$685
383	F15_FLUEI	='C-540:r22F15'!B$685	='C-540:r22F15'!C$685	='C-540:r22F15'!D$685	='C-540:r22F15'!E$685
384	F16_DUCT	='C-540:r22F16'!B$685	='C-540:r22F16'!C$685	='C-540:r22F16'!D$685	='C-540:r22F16'!E$685
385	F17_HEEAC	='C-540:r22F17'!B$685	='C-540:r22F17'!C$685	='C-540:r22F17'!D$685	='C-540:r22F17'!E$685
386	F18_EMCS	='C-540:r22F18'!B$685	='C-540:r22F18'!C$685	='C-540:r22F18'!D$685	='C-540:r22F18'!E$685
387	F19_GHP	='C-540:r22F19'!B$685	='C-540:r22F19'!C$685	='C-540:r22F19'!D$685	='C-540:r22F19'!E$685
388	F20_RADBR	='C-540:r22F20'!B$685	='C-540:r22F20'!C$685	='C-540:r22F20'!D$685	='C-540:r22F20'!E$685
389	F21_SHADO	='C-540:r22F21'!B$685	='C-540:r22F21'!C$685	='C-540:r22F21'!D$685	='C-540:r22F21'!E$685
390	F22_RROOF	='C-540:r22F22'!B$685	='C-540:r22F22'!C$685	='C-540:r22F22'!D$685	='C-540:r22F22'!E$685
391	F23_EINSL	='C-540:r22F23'!B$685	='C-540:r22F23'!C$685	='C-540:r22F23'!D$685	='C-540:r22F23'!E$685
392	F24_BINSL	='C-540:r22F24'!B$685	='C-540:r22F24'!C$685	='C-540:r22F24'!D$685	='C-540:r22F24'!E$685
393	F25_CINSL	='C-540:r22F25'!B$685	='C-540:r22F25'!C$685	='C-540:r22F25'!D$685	='C-540:r22F25'!E$685
394	F26_SWIND	='C-540:r22F26'!B$685	='C-540:r22F26'!C$685	='C-540:r22F26'!D$685	='C-540:r22F26'!E$685
395	F27_WINDF	='C-540:r22F27'!B$685	='C-540:r22F27'!C$685	='C-540:r22F27'!D$685	='C-540:r22F27'!E$685
396	F28_WHBLA	='C-540:r22F28'!B$685	='C-540:r22F28'!C$685	='C-540:r22F28'!D$685	='C-540:r22F28'!E$685
397	F29_HWHP	='C-540:r22F29'!B$685	='C-540:r22F29'!C$685	='C-540:r22F29'!D$685	='C-540:r22F29'!E$685
398	F30_SREST	='C-540:r22F30'!B$685	='C-540:r22F30'!C$685	='C-540:r22F30'!D$685	='C-540:r22F30'!E$685
399	F31_FREST	='C-540:r22F31'!B$685	='C-540:r22F31'!C$685	='C-540:r22F31'!D$685	='C-540:r22F31'!E$685
400	F32_DESUP	='C-540:r22F32'!B$685	='C-540:r22F32'!C$685	='C-540:r22F32'!D$685	='C-540:r22F32'!E$685
401	F33_IHWH	='C-540:r22F33'!B$685	='C-540:r22F33'!C$685	='C-540:r22F33'!D$685	='C-540:r22F33'!E$685
402	F34_TRANF	='C-540:r22F34'!B$685	='C-540:r22F34'!C$685	='C-540:r22F34'!D$685	='C-540:r22F34'!E$685
403	F35_HDISR	='C-540:r22F35'!B$685	='C-540:r22F35'!C$685	='C-540:r22F35'!D$685	='C-540:r22F35'!E$685
404	F36_MSUMP	='C-540:r22F36'!B$685	='C-540:r22F36'!C$685	='C-540:r22F36'!D$685	='C-540:r22F36'!E$685
405	F37_PV	='C-540:r22F37'!B$685	='C-540:r22F37'!C$685	='C-540:r22F37'!D$685	='C-540:r22F37'!E$685
406	F38_WINDE	='C-540:r22F38'!B$685	='C-540:r22F38'!C$685	='C-540:r22F38'!D$685	='C-540:r22F38'!E$685
407	F39_MICCM	='C-540:r22F39'!B$685	='C-540:r22F39'!C$685	='C-540:r22F39'!D$685	='C-540:r22F39'!E$685
408	F40_SOLSL	='C-540:r22F40'!B$685	='C-540:r22F40'!C$685	='C-540:r22F40'!D$685	='C-540:r22F40'!E$685
409	F41_SOLWH	='C-540:r22F41'!B$685	='C-540:r22F41'!C$685	='C-540:r22F41'!D$685	='C-540:r22F41'!E$685
410	F42_SOLWL	='C-540:r22F42'!B$685	='C-540:r22F42'!C$685	='C-540:r22F42'!D$685	='C-540:r22F42'!E$685
411	F43_SOLWB	='C-540:r22F43'!B$685	='C-540:r22F43'!C$685	='C-540:r22F43'!D$685	='C-540:r22F43'!E$685
412	F44_RFRIG	='C-540:r22F44'!B$685	='C-540:r22F44'!C$685	='C-540:r22F44'!D$685	='C-540:r22F44'!E$685
413	F45_ECOMP	='C-540:r22F45'!B$685	='C-540:r22F45'!C$685	='C-540:r22F45'!D$685	='C-540:r22F45'!E$685

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 10 of 12 pages)

	A	B	C	D	E
414	F46_EHP	='C-540:r22F46'!B$685	='C-540:r22F46'!C$685	='C-540:r22F46'!D$685	='C-540:r22F46'!E$685
415	F47_DCONP	='C-540:r22F47'!B$685	='C-540:r22F47'!C$685	='C-540:r22F47'!D$685	='C-540:r22F47'!E$685
416	F48_VHTRR	='C-540:r22F48'!B$685	='C-540:r22F48'!C$685	='C-540:r22F48'!D$685	='C-540:r22F48'!E$685
417	F49_SMOTR	='C-540:r22F49'!B$685	='C-540:r22F49'!C$685	='C-540:r22F49'!D$685	='C-540:r22F49'!E$685
418	F50_MMOTR	='C-540:r22F50'!B$685	='C-540:r22F50'!C$685	='C-540:r22F50'!D$685	='C-540:r22F50'!E$685
419	F51_LMOTR	='C-540:r22F51'!B$685	='C-540:r22F51'!C$685	='C-540:r22F51'!D$685	='C-540:r22F51'!E$685
420	F52_SVSD	='C-540:r22F52'!B$685	='C-540:r22F52'!C$685	='C-540:r22F52'!D$685	='C-540:r22F52'!E$685
421	F53_MVSD	='C-540:r22F53'!B$685	='C-540:r22F53'!C$685	='C-540:r22F53'!D$685	='C-540:r22F53'!E$685
422	F54_LVSD	='C-540:r22F54'!B$685	='C-540:r22F54'!C$685	='C-540:r22F54'!D$685	='C-540:r22F54'!E$685
423					
424					
425		**Cumulative quantity penetration by ECO above the fy93 pen**			
426		*(do not copy downward, can copy across)*			
427		fy94	fy95	fy96	fy97
428	F01_2X4FL	='C-540:r22F01'!B$680	='C-540:r22F01'!C$680	='C-540:r22F01'!D$680	='C-540:r22F01'!E$680
429	F02_COMFL	='C-540:r22F02'!B$680	='C-540:r22F02'!C$680	='C-540:r22F02'!D$680	='C-540:r22F02'!E$680
430	F03_EXLIT	='C-540:r22F03'!B$680	='C-540:r22F03'!C$680	='C-540:r22F03'!D$680	='C-540:r22F03'!E$680
431	F04_OCSEN	='C-540:r22F04'!B$680	='C-540:r22F04'!C$680	='C-540:r22F04'!D$680	='C-540:r22F04'!E$680
432	F05_SLAMP	='C-540:r22F05'!B$680	='C-540:r22F05'!C$680	='C-540:r22F05'!D$680	='C-540:r22F05'!E$680
433	F06_OLTCN	='C-540:r22F06'!B$680	='C-540:r22F06'!C$680	='C-540:r22F06'!D$680	='C-540:r22F06'!E$680
434	F07_CONLL	='C-540:r22F07'!B$680	='C-540:r22F07'!C$680	='C-540:r22F07'!D$680	='C-540:r22F07'!E$680
435	F08_PTHRM	='C-540:r22F08'!B$680	='C-540:r22F08'!C$680	='C-540:r22F08'!D$680	='C-540:r22F08'!E$680
436	F09_MBOIL	='C-540:r22F09'!B$680	='C-540:r22F09'!C$680	='C-540:r22F09'!D$680	='C-540:r22F09'!E$680
437	F10_COOLS	='C-540:r22F10'!B$680	='C-540:r22F10'!C$680	='C-540:r22F10'!D$680	='C-540:r22F10'!E$680
438	F11_HEGAS	='C-540:r22F11'!B$680	='C-540:r22F11'!C$680	='C-540:r22F11'!D$680	='C-540:r22F11'!E$680
439	F12_NEGAS	='C-540:r22F12'!B$680	='C-540:r22F12'!C$680	='C-540:r22F12'!D$680	='C-540:r22F12'!E$680
440	F13_GCHIL	='C-540:r22F13'!B$680	='C-540:r22F13'!C$680	='C-540:r22F13'!D$680	='C-540:r22F13'!E$680
441	F14_GSHP	='C-540:r22F14'!B$680	='C-540:r22F14'!C$680	='C-540:r22F14'!D$680	='C-540:r22F14'!E$680
442	F15_FLUEI	='C-540:r22F15'!B$680	='C-540:r22F15'!C$680	='C-540:r22F15'!D$680	='C-540:r22F15'!E$680
443	F16_DUCT	='C-540:r22F16'!B$680	='C-540:r22F16'!C$680	='C-540:r22F16'!D$680	='C-540:r22F16'!E$680
444	F17_HEEAC	='C-540:r22F17'!B$680	='C-540:r22F17'!C$680	='C-540:r22F17'!D$680	='C-540:r22F17'!E$680
445	F18_EMCS	='C-540:r22F18'!B$680	='C-540:r22F18'!C$680	='C-540:r22F18'!D$680	='C-540:r22F18'!E$680
446	F19_GHP	='C-540:r22F19'!B$680	='C-540:r22F19'!C$680	='C-540:r22F19'!D$680	='C-540:r22F19'!E$680
447	F20_RADBR	='C-540:r22F20'!B$680	='C-540:r22F20'!C$680	='C-540:r22F20'!D$680	='C-540:r22F20'!E$680
448	F21_SHADD	='C-540:r22F21'!B$680	='C-540:r22F21'!C$680	='C-540:r22F21'!D$680	='C-540:r22F21'!E$680
449	F22_RROOF	='C-540:r22F22'!B$680	='C-540:r22F22'!C$680	='C-540:r22F22'!D$680	='C-540:r22F22'!E$680
450	F23_EINSL	='C-540:r22F23'!B$680	='C-540:r22F23'!C$680	='C-540:r22F23'!D$680	='C-540:r22F23'!E$680
451	F24_BINSL	='C-540:r22F24'!B$680	='C-540:r22F24'!C$680	='C-540:r22F24'!D$680	='C-540:r22F24'!E$680
452	F25_CINSL	='C-540:r22F25'!B$680	='C-540:r22F25'!C$680	='C-540:r22F25'!D$680	='C-540:r22F25'!E$680
453	F26_SWIND	='C-540:r22F26'!B$680	='C-540:r22F26'!C$680	='C-540:r22F26'!D$680	='C-540:r22F26'!E$680
454	F27_WINDF	='C-540:r22F27'!B$680	='C-540:r22F27'!C$680	='C-540:r22F27'!D$680	='C-540:r22F27'!E$680
455	F28_WHBLA	='C-540:r22F28'!B$680	='C-540:r22F28'!C$680	='C-540:r22F28'!D$680	='C-540:r22F28'!E$680
456	F29_HWHP	='C-540:r22F29'!B$680	='C-540:r22F29'!C$680	='C-540:r22F29'!D$680	='C-540:r22F29'!E$680
457	F30_SREST	='C-540:r22F30'!B$680	='C-540:r22F30'!C$680	='C-540:r22F30'!D$680	='C-540:r22F30'!E$680
458	F31_FREST	='C-540:r22F31'!B$680	='C-540:r22F31'!C$680	='C-540:r22F31'!D$680	='C-540:r22F31'!E$680
459	F32_DESUP	='C-540:r22F32'!B$680	='C-540:r22F32'!C$680	='C-540:r22F32'!D$680	='C-540:r22F32'!E$680

Table E-4. Core Main (Linking) Spreadsheet - Formula View (page 11 of 12 pages)

	A	B	C	D	E
460	F33_HWH	='C-540:r22F33'!B$680	='C-540:r22F33'!C$680	='C-540:r22F33'!D$680	='C-540:r22F33'!E$680
461	F34_TRANF	='C-540:r22F34'!B$680	='C-540:r22F34'!C$680	='C-540:r22F34'!D$680	='C-540:r22F34'!E$680
462	F35_HDISR	='C-540:r22F35'!B$680	='C-540:r22F35'!C$680	='C-540:r22F35'!D$680	='C-540:r22F35'!E$680
463	F36_MSUMP	='C-540:r22F36'!B$680	='C-540:r22F36'!C$680	='C-540:r22F36'!D$680	='C-540:r22F36'!E$680
464	F37_PV	='C-540:r22F37'!B$680	='C-540:r22F37'!C$680	='C-540:r22F37'!D$680	='C-540:r22F37'!E$680
465	F38_WINDE	='C-540:r22F38'!B$680	='C-540:r22F38'!C$680	='C-540:r22F38'!D$680	='C-540:r22F38'!E$680
466	F39_MICCM	='C-540:r22F39'!B$680	='C-540:r22F39'!C$680	='C-540:r22F39'!D$680	='C-540:r22F39'!E$680
467	F40_SOLSL	='C-540:r22F40'!B$680	='C-540:r22F40'!C$680	='C-540:r22F40'!D$680	='C-540:r22F40'!E$680
468	F41_SOLWH	='C-540:r22F41'!B$680	='C-540:r23F41'!C$680	='C-540:r22F41'!D$680	='C-540:r22F41'!E$680
469	F42_SOLWL	='C-540:r22F42'!B$680	='C-540:r22F42'!C$680	='C-540:r22F42'!D$680	='C-540:r22F42'!E$680
470	F43_SOLWB	='C-540:r22F43'!B$680	='C-540:r22F43'!C$680	='C-540:r22F43'!D$680	='C-540:r22F43'!E$680
471	F44_RFRIG	='C-540:r22F44'!B$680	='C-540:r22F44'!C$680	='C-540:r22F44'!D$680	='C-540:r22F44'!E$680
472	F45_ECOMP	='C-540:r22F45'!B$680	='C-540:r22F45'!C$680	='C-540:r22F45'!D$680	='C-540:r22F45'!E$680
473	F46_EHP	='C-540:r22F46'!B$680	='C-540:r22F46'!C$680	='C-540:r22F46'!D$680	='C-540:r22F46'!E$680
474	F47_DCONP	='C-540:r22F47'!B$680	='C-540:r22F47'!C$680	='C-540:r22F47'!D$680	='C-540:r22F47'!E$680
475	F48_VHTRR	='C-540:r22F48'!B$680	='C-540:r22F48'!C$680	='C-540:r22F48'!D$680	='C-540:r22F48'!E$680
476	F49_SMOTR	='C-540:r22F49'!B$680	='C-540:r22F49'!C$680	='C-540:r22F49'!D$680	='C-540:r22F49'!E$680
477	F50_MMOTR	='C-540:r22F50'!B$680	='C-540:r22F50'!C$680	='C-540:r22F50'!D$680	='C-540:r22F50'!E$680
478	F51_LMOTR	='C-540:r22F51'!B$680	='C-540:r22F51'!C$680	='C-540:r22F51'!D$680	='C-540:r22F51'!E$680
479	F52_SVSD	='C-540:r22F52'!B$680	='C-540:r22F52'!C$680	='C-540:r22F52'!D$680	='C-540:r22F52'!E$680
480	F53_MVSD	='C-540:r22F53'!B$680	='C-540:r22F53'!C$680	='C-540:r22F53'!D$680	='C-540:r22F53'!E$680
481	F54_LVSD	='C-540:r22F54'!B$680	='C-540:r22F54'!C$680	='C-540:r22F54'!D$680	='C-540:r22F54'!E$680
482					
483					
484		**Percent of Final Penetration**			
485		Cum quant pen (above 93 pen) divided by last year cum quant pen i			
486		(do not copy downward, can copy across)			
487		fy94	fy95	fy96	fy97
488	F01_2X4FL	='C-540:r22F01'!B$680/$M428	='C-540:r22F01'!C$680/$M428	='C-540:r22F01'!D$680/$M428	='C-540:r22F01'!E$680/$M428
489	F02_COMFL	='C-540:r22F02'!B$680/$M429	='C-540:r22F02'!C$680/$M429	='C-540:r22F02'!D$680/$M429	='C-540:r22F02'!E$680/$M429
490	F03_EXLIT	='C-540:r22F03'!B$680/$M430	='C-540:r22F03'!C$680/$M430	='C-540:r22F03'!D$680/$M430	='C-540:r22F03'!E$680/$M430
491	F04_OCSEN	='C-540:r22F04'!B$680/$M431	='C-540:r22F04'!C$680/$M431	='C-540:r22F04'!D$680/$M431	='C-540:r22F04'!E$680/$M431
492	F05_SLAMP	='C-540:r22F05'!B$680/$M432	='C-540:r22F05'!C$680/$M432	='C-540:r22F05'!D$680/$M432	='C-540:r22F05'!E$680/$M432
493	F06_OLTCN	='C-540:r22F06'!B$680/$M433	='C-540:r22F06'!C$680/$M433	='C-540:r22F06'!D$680/$M433	='C-540:r22F06'!E$680/$M433
494	F07_CONLL	='C-540:r22F07'!B$680/$M434	='C-540:r22F07'!C$680/$M434	='C-540:r22F07'!D$680/$M434	='C-540:r22F07'!E$680/$M434
495	F08_PTHRM	='C-540:r22F08'!B$680/$M435	='C-540:r22F08'!C$680/$M435	='C-540:r22F08'!D$680/$M435	='C-540:r22F08'!E$680/$M435
496	F09_MBOIL	='C-540:r22F09'!B$680/$M436	='C-540:r22F09'!C$680/$M436	='C-540:r22F09'!D$680/$M435	='C-540:r22F09'!E$680/$M436
497	F10_COOLS	='C-540:r22F10'!B$680/$M437	='C-540:r22F10'!C$680/$M437	='C-540:r22F10'!D$680/$M437	='C-540:r22F10'!E$680/$M437
498	F11_HEGAS	='C-540:r22F11'!B$680/$M438	='C-540:r22F11'!C$680/$M438	='C-540:r22F11'!D$680/$M438	='C-540:r22F11'!E$680/$M438
499	F12_NEGAS	='C-540:r22F12'!B$680/$M439	='C-540:r22F12'!C$680/$M439	='C-540:r22F12'!D$680/$M439	='C-540:r22F12'!E$680/$M439
500	F13_GCHIL	='C-540:r22F13'!B$680/$M440	='C-540:r22F13'!C$680/$M440	='C-540:r22F13'!D$680/$M440	='C-540:r22F13'!E$680/$M440
501	F14_GSHP	na	na	na	na
502	F15_FLUEI	='C-540:r22F15'!B$680/$M442	='C-540:r22F15'!C$680/$M442	='C-540:r22F15'!D$680/$M442	='C-540:r22F15'!E$680/$M442
503	F16_DUCT	='C-540:r22F16'!B$680/$M443	='C-540:r22F16'!C$680/$M443	='C-540:r22F16'!D$680/$M443	='C-540:r22F16'!E$680/$M443
504	F17_HEEAC	='C-540:r22F17'!B$680/$M444	='C-540:r22F17'!C$680/$M444	='C-540.r22F17'!D$680/$M444	='C-540:r22F17'!E$680/$M444
505	F18_EMCS	='C-540:r22F18'!B$680/$M445	='C-540:r22F18'!C$680/$M445	='C-540:r22F18'!D$680/$M445	='C-540:r22F18'!E$680/$M445

Table E-4. Core Main (Linking) Spreadsheet - Formula View
(page 12 of 12 pages)

	A	B	C	D	E
506	F19_GHP	='C-540:r22F19'!B$680/$M446	='C-540:r22F19'!C$680/$M446	='C-540:r22F19'!D$680/$M446	='C-540:r22F19'!E$680/$M446
507	F20_RADBR	='C-540:r22F20'!B$680/$M447	='C-540:r22F20'!C$680/$M447	='C-540:r22F20'!D$680/$M447	='C-540:r22F20'!E$680/$M447
508	F21_SHADD	='C-540:r22F21'!B$680/$M448	='C-540:r22F21'!C$680/$M448	='C-540:r22F21'!D$680/$M448	='C-540:r22F21'!E$680/$M448
509	F22_RROOF	='C-540:r22F22'!B$680/$M449	='C-540:r22F22'!C$680/$M449	='C-540:r22F22'!D$680/$M449	='C-540:r22F22'!E$680/$M449
510	F23_EINSL	na	na	na	na
511	F24_BINSL	='C-540:r22F24'!B$680/$M451	='C-540:r22F24'!C$680/$M451	='C-540:r22F24'!D$680/$M451	='C-540:r22F24'!E$680/$M451
512	F25_CINSL	='C-540:r22F25'!B$680/$M452	='C-540:r22F25'!C$680/$M452	='C-540:r22F25'!D$680/$M452	='C-540:r22F25'!E$680/$M452
513	F26_SWIND	na	na	na	na
514	F27_WINDF	='C-540:r22F27'!B$680/$M454	='C-540:r22F27'!C$680/$M454	='C-540:r22F27'!D$680/$M454	='C-540:r22F27'!E$680/$M454
515	F28_WHBLA	='C-540:r22F28'!B$680/$M455	='C-540:r22F28'!C$680/$M455	='C-540:r22F28'!D$680/$M455	='C-540:r22F28'!E$680/$M455
516	F29_HWHP	='C-540:r22F29'!B$680/$M456	='C-540:r22F29'!C$680/$M456	='C-540:r22F29'!D$680/$M456	='C-540:r22F29'!E$680/$M456
517	F30_SREST	='C-540:r22F30'!B$680/$M457	='C-540:r22F30'!C$680/$M457	='C-540:r22F30'!D$680/$M457	='C-540:r22F30'!E$680/$M457
518	F31_FREST	='C-540:r22F31'!B$680/$M458	='C-540:r22F31'!C$680/$M458	='C-540:r22F31'!D$680/$M458	='C-540:r22F31'!E$680/$M458
519	F32_DESUP	='C-540:r22F32'!B$680/$M459	='C-540:r22F32'!C$680/$M459	='C-540:r22F32'!D$680/$M459	='C-540:r22F32'!E$680/$M459
520	F33_IHWH	='C-540:r22F33'!B$680/$M460	='C-540:r22F33'!C$680/$M460	='C-540:r22F33'!D$680/$M460	='C-540:r22F33'!E$680/$M460
521	F34_TRANF	na	na	na	na
522	F35_HDISR	='C-540:r22F35'!B$680/$M462	='C-540:r22F35'!C$680/$M462	='C-540:r22F35'!D$680/$M462	='C-540:r22F35'!E$680/$M462
523	F36_MSUMP	='C-540:r22F36'!B$680/$M463	='C-540:r22F36'!C$680/$M463	='C-540:r22F36'!D$680/$M463	='C-540:r22F36'!E$680/$M463
524	F37_PV	na	na	na	na
525	F38_WINDE	='C-540:r22F38'!B$680/$M465	='C-540:r22F38'!C$680/$M465	='C-540:r22F38'!D$680/$M465	='C-540:r22F38'!E$680/$M465
526	F39_MICCM	='C-540:r22F39'!B$680/$M466	='C-540:r22F39'!C$680/$M466	='C-540:r22F39'!D$680/$M466	='C-540:r22F39'!E$680/$M466
527	F40_SOLSL	='C-540:r22F40'!B$680/$M467	='C-540:r22F40'!C$680/$M467	='C-540:r22F40'!D$680/$M467	='C-540:r22F40'!E$680/$M467
528	F41_SOLWH	='C-540:r22F41'!B$680/$M468	='C-540:r22F41'!C$680/$M468	='C-540:r22F41'!D$680/$M468	='C-540:r22F41'!E$680/$M468
529	F42_SOLWL	='C-540:r22F42'!B$680/$M469	='C-540:r22F42'!C$680/$M469	='C-540:r22F42'!D$680/$M469	='C-540:r22F42'!E$680/$M469
530	F43_SOLWB	='C-540:r22F43'!B$680/$M470	='C-540:r22F43'!C$680/$M470	='C-540:r22F43'!D$680/$M470	='C-540:r22F43'!E$680/$M470
531	F44_RFRIG	='C-540:r22F44'!B$680/$M471	='C-540:r22F44'!C$680/$M471	='C-540:r22F44'!D$680/$M471	='C-540:r22F44'!E$680/$M471
532	F45_ECOMP	na	na	na	na
533	F46_EHP	na	na	na	na
534	F47_DCOMP	='C-540:r22F47'!B$680/$M474	='C-540:r22F47'!C$680/$M474	='C-540:r22F47'!D$680/$M474	='C-540:r22F47'!E$680/$M474
535	F48_VHTRR	='C-540:r22F48'!B$680/$M475	='C-540:r22F48'!C$680/$M475	='C-540:r22F48'!D$680/$M475	='C-540:r22F48'!E$680/$M475
536	F49_SMOTR	='C-540:r22F49'!B$680/$M476	='C-540:r22F49'!C$680/$M476	='C-540:r22F49'!D$680/$M476	='C-540:r22F49'!E$680/$M476
537	F50_MMOTR	='C-540:r22F50'!B$680/$M477	='C-540:r22F50'!C$680/$M477	='C-540:r22F50'!D$680/$M477	='C-540:r22F50'!E$680/$M477
538	F51_LMOTR	='C-540:r22F51'!B$680/$M478	='C-540:r22F51'!C$680/$M478	='C-540:r22F51'!D$680/$M478	='C-540:r22F51'!E$680/$M478
539	F52_SVSD	='C-540:r22F52'!B$680/$M479	='C-540:r22F52'!C$680/$M479	='C-540:r22F52'!D$680/$M479	='C-540:r22F52'!E$680/$M479
540	F53_MVSD	='C-540:r22F53'!B$680/$M480	='C-540:r22F53'!C$680/$M480	='C-540:r22F53'!D$680/$M480	='C-540:r22F53'!E$680/$M480
541	F54_LVSD	='C-540:r22F54'!B$680/$M481	='C-540:r22F54'!C$680/$M481	='C-540:r22F54'!D$680/$M481	='C-540:r22F54'!E$680/$M481

Table E-5. EofS ECO Spreadsheet - Value View (page 1 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		2X4FL	2x4 Fluorescent Lighting Retrofit					RISC	RISC	RISC	RISC	RISC	RISC
2		Col B: Costs in 1000s of dollars (CERL 100% data divided by 1000*100)											
3		Col C: Energy savgs in 1000s of MBtu's (CERL 100% data divided by 1000*100)											
4		Col D: Demand savings in Kilowatts (CERL 100% data divided by 100)											
5		Col E: Environmental Savings in Tons (CERL sum pollution abated 100%-data divided by 100)											
6		Col F: Quantity in no of items or sq ft (CERL 100% data divided by 100)											
7		note: Col H has formulas											
8		Data for 1% Investment					Percent	Investmnt					
9	6 Charact	Init_Cost	Annual	Annual	Annual	Quantity	left_from	%_Limit					
10	Code Name	1%_Invest	Energy_Sv	Demand_Sv	Envir_Sav	Opportunit	Start	Logic					
11	BRAGG	77.239029	0.8225068	72.6208	205.34628	567.35	85	0					
12	CMPBEL	48.552425	0.517002	46.5632	192.96685	379.4	85	0					
13	CARSON	58.38559	0.5036396	56.014933	203.03632	437.61667	85	0					
14	DEVENS	64.257853	0.4468058	52.535467	134.60758	410.43333	85	0					
15	F_DRUM	43.6144	0.3701476	39.612267	65.775636	311.03333	85	0					
16	F_HOOD	67.979399	0.8938959	71.8144	228.58682	561.05	85	0					
17	S_HOUS	55.398475	0.7497161	58.523733	169.93698	457.21667	85	0					
18	IRWIN	18.434445	0.1560894	14.813867	14.694525	115.73333	85	0					
19	LEWIS	0	0	0	0	0	0	0					
20	McCOY	32.329211	0.2982242	31.016533	85.581111	242.31667	85	0					
21	McPHER	33.137656	0.4001337	36.228267	98.241171	283.03333	85	0					
22	HINDS	41.232268	0.378985	38.766933	99.278626	302.86667	85	0					
23	FT_ORD	53.701376	0.3193978	45.486933	28.322716	355.36667	85	0					
24	F_POLK	44.17777	0.5087644	39.5584	112.81134	309.05	85	0					
25	RILEY	47.786229	0.4774259	46.801067	134.90132	365.63333	85	0					
26	WAINWR	0	0	0	0	0	0	0					
27	STEWRT	29.709152	0.4177422	32.48	96.35346	253.75	85	0					
28	BENNIN	62.969742	0.6373866	68.842667	199.14399	537.83333	85	0					
29	BLISS	70.43904	0.8598502	74.4128	224.46746	581.35	85	0					
30	FT_DIX	40.169073	0.3487325	36.3328	30.363455	283.85	85	0					
31	EUSTIS	42.312312	0.4394232	39.7824	83.090688	310.8	85	0					
32	GORDON	60.37446	0.7564243	66.005333	181.5145	515.66667	85	0					
33	HUACHU	47.858656	0.4173245	37.4976	80.62345	292.95	85	0					
34	JACKSN	52.604496	0.5689143	49.4592	66.901983	386.4	85	0					
35	F_KNOX	76.381347	0.732898	68.394667	273.64603	534.33333	85	0					
36	LEAVWN	35.313627	0.3539318	34.5856	99.448951	270.2	85	0					
37	FT_LEE	44.742411	0.4350617	42.0672	83.299913	328.65	85	0					
38	RUCKER	45.065154	0.6129222	47.607467	150.60256	371.93333	85	0					
39	F_SILL	0	0	0	0	0	0	0					
40	LEN_WO	56.767037	0.5521366	53.879467	162.20898	420.93333	85	0					
41	ANNIST	5.3009513	0.0620987	5.6	15.60538	43.75	85	0					
42	CORP_C	6.6155672	0.1014522	6.3668	24.992586	54.6	85	0					
43	PINE_B	3.8967352	0.0487126	4.2112	10.491076	32.9	85	0					
44	PUEBLO	0	0	0	0	0	0	0					
45	RED_RV	6.8700328	0.0829299	7.2576	21.503224	56.7	85	0					
46	ROCK_I	24.126277	0.214426	22.663733	31.181004	177.21667	85	0					
47	TOOELE	7.3001445	0.0619361	7.0037333	25.398946	54.716667	85	0					
48	WATERV	4.2861864	0.0340334	3.9125333	6.0460036	30.566667	85	0					
49	HO_AAP	5.0736685	0.056291	5.4208	14.181306	42.35	85	0					
50	LK_AAP	1.1829568	0.0116721	1.1349333	3.8633588	8.8666667	85	0					
51	RD_AAP	6.3017391	0.0587389	6.5109333	11.057585	50.866667	85	0					
52	DETROI	17.156499	0.1449486	15.8144	46.321636	123.85	85	0					
53	HMCUT	36.712606	0.2998544	32.285867	26.080122	252.23333	85	0					
54	REDST	47.722697	0.5694509	50.414933	145.34901	393.86667	85	0					
55	ABERDE	62.530736	0.5725278	61.2416	155.14614	478.45	85	0					
56	PICTNY	21.736108	0.1606998	19.652267	14.421946	153.53333	85	0					
57	W_S_MR	20.904569	0.2335855	20.4736	84.256655	159.95	85	0					
58	DTRICK	6.7242269	0.0615066	6.5856	16.605561	51.45	85	0					
59	W_REED	62.912563	0.5942797	59.150933	155.45157	462.11667	85	0					
60	BLVOIR	54.939297	0.5054192	51.6544	96.541324	403.55	85	0					
61		The next row contains formulas that are not sent to the optimizer											
62	sum	1764.2482	18.052107	1691.9019	4460.4753								
63		Below: Col B. Quantity of 1st seg.(unreduced investments) Col C. reduction fraction for 2nd seg cost.											
64		Col D. Big constant for binary constraints on buying 2nd seg (reduced cost investments);											
65		500000	0.9	149961									
66		(Big constant can be full ECO investment cost,											
67		in no roll-over case it could be annual budget)											
68		Data: Annual Cost Savings (1% Investment)											
69		In 1000s of dollars (Annual adjustments are for energy prices increasing above inflation rate)											
70		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
71	BRAGG	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656	21.34656
72	CMPBEL	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434	13.696434
73	CARSON	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056	10.3056
74	DEVENS	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737	19.776737
75	F_DRUM	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773	15.829773
76	F_HOOD	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253	21.175253
77	S_HOUS	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441	18.926441
78	IRWIN	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059	9.0234059
79	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
80	McCOY	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604	6.8875604
81	McPHER	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225	10.935225
82	HINDS	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402	8.7473402
83	FT_ORD	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287	16.667287
84	F_POLK	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951	6.2646951
85	RILEY	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452	11.387452
86	WAINWR	0	0	0	0	0	0	0	0	0	0	0	0
87	STEWRT	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616	10.57616

Table E-5. EofS ECO Spreadsheet - Value View (page 2 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
88	BRAGG	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919	33.389919
89	BLISS	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761	27.823761
90	FT_DIX	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585	17.116585
91	EUSTIS	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287	9.5996287
92	GORDON	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648	12.786648
93	HUACHU	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754	12.078754
94	JACKSN	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256	15.435256
95	F_KNOX	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065	16.125065
96	LEAVEN	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994	6.2462994
97	FT_LEE	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172	9.5895172
98	RUCKER	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933	10.40933
99	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
100	LEN_WD	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306	13.173306
101	ANNIST	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567	1.5531567
102	CORP_C	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992	1.8992
103	PINE_B	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391	0.958391
104	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
105	RED_RV	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843	2.0869843
106	ROCK_I	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833	8.923833
107	TOOELE	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261	1.9969261
108	WATERV	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983	1.5816983
109	HO_AAP	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049	1.6581049
110	LK_AAP	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676	0.2246676
111	RD_AAP	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034	1.0829034
112	DETROI	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564	11.91564
113	MNMOUT	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974	23.68974
114	REDST	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959	21.410959
115	ABERDE	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978	31.238978
116	PICTNY	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154	13.604154
117	W_S_MR	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998	5.5908998
118	NATICK	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059	1.427059
119	W_REED	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236	13.492236
120	BLUGRS	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424	11.637424
121		The next row contains formulas that are not sent to the optimizer											
122	sum	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185	541.29185
123													
124		Binary Cells (must be 1 to buy 2nd segment)											
125		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
126		0	0	0	0	1	1	1	1	1	0	1	1
127													
128		Decision cells (Percent investment) for 1st segment											
129													
130		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
131	BENNG	0	0	0	0	0	0	0	0	0	0	0	0
132	CAMPBE	0	0	0	0	0	0	0	0	0	0	0	0
133	CARSON	0	0	0	0	0	0	0	0	0	0	0	0
134	DEVENS	0	0	0	70.399666	0	0	0	0	0	0	0	0
135	F_DRUM	0	0	65	0	0	0	0	0	0	0	0	0
136	F_HOOD	0	0	0	65	0	0	0	0	0	0	0	0
137	S_HOUS	0	0	72.980804	12.019194	0	0	0	0	0	0	0	0
138	IRWIN	0	65	0	0	0	0	0	0	0	0	0	0
139	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
140	MCCOY	0	0	0	0	0	0	0	0	0	0	0	0
141	MCPHER	0	0	0	65	0	0	0	0	0	0	0	0
142	MEADE	0	0	0	0	0	0	0	0	0	0	0	0
143	FT_ORD	0	0	0	65	0	0		0	0	0	0	0
144	F_POLK	0	0	0	0	0	0		0	0	0	0	0
145	RILEY	0	0	0	0	0	0		0	0	0	0	0
146	WAINWR	0	0	0	0	0	0		0	0	0	0	0
147	STEWRT	0	0	65	0	0	0		0	0	0	0	0
148	BRAGG	65	0	0	0	0	0	0	0	0	0	0	0
149	BLISS	0	20.171255	64.828743	0	0	0	0	0	0	0	0	0
150	FT_DIX	0	65	0	0	0	0	0	0	0	0	0	0
151	EUSTIS	0	0	0	0	0	0	0	0	0	0	0	0
152	GORDON	0	0	0	0	0	0	0	0	0	0	0	0
153	HUACHU	0	0	0	0	0	0	0	0	0	0	0	0
154	JACKSN	0	0	0	0	0	0	0	0	0	0	0	0
155	F_KNOX	0	0	0	0	0	0	0	0	0	0	0	0
156	LEAVEN	0	0	0	0	0	0	0	0	0	0	0	0
157	FT_LEE	0	0	0	0	0	0	0	0	0	0	0	0
158	RUCKER	0	0	0	0	0	0	0	0	0	0	0	0
159	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
160	LEN_WD	0	0	0	0	0	0	0	0	0	0	0	0
161	ANNIST	0	0	0	0	60.221631	0	0	0	0	0	0	0
162	CORP_C	0	0	0	0	65	0	0	0	0	0	0	0
163	PINE_B	0	0	0	0	21.029081	0	0	0	0	0	0	0
164	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
165	RED_RV	0	0	0	65	0	0	0	0	0	0	0	0
166	ROCK_I	0	0	65	0	0	0	0	0	0	0	0	0
167	TOOELE	0	0	0	0	0	0	0	0	0	0	0	0
168	WATERV	0	0	65	0	0	0	0	0	0	0	0	0
169	HO_AAP	0	0	0	65	0	0	0	0	0	0	0	0
170	LK_AAP	0	0	0	0	0	0	0	0	0	0	0	0
171	RD_AAP	0	0	0	0	0	0	0	0	0	0	0	0
172	DETROI	65	0	0	0	0	0	0	0	0	0	0	0
173	MNMOUT	65	0	0	0	0	0	0	0	0	0	0	0
174	REDST	0	15	0	0	0	0	0	0	0	0	0	0

Table E-5. EofS ECO Spreadsheet - Value View (page 3 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
175	AMBROSE	12.853145	72.146858	0	0	0	0	0	0	0	0	0	0
176	FICDNY	85	0	0	0	0	0	0	0	0	0	0	0
177	W_S_HR	0	0	0	0	0	0	0	0	0	0	0	0
178	DYRICK	0	0	0	0	0	0	0	0	0	0	0	0
179	W_REED	0	0	0	0	0	0	0	0	0	0	0	0
180	SLVOTR	0	0	0	0	0	0	0	0	0	0	0	0
181													
182													
183													
184													
185													
186													
187													
188		Decision cells (Percent investment) for 2nd segment											
189													
190		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
191	BRAGG	0	0	0	0	85	0	0	0	0	0	0	0
192	CAMPBE	0	0	0	0	85	0	0	0	0	0	0	0
193	CARSON	0	0	0	0	0	0	27.431328	57.568672	0	0	0	0
194	DEVENS	0	0	0	0	14.600334	0	0	0	0	0	0	0
195	F_DRUM	0	0	0	0	0	0	0	0	0	0	0	0
196	F_HOOD	0	0	0	0	0	0	0	0	0	0	0	0
197	S_HOUS	0	0	0	0	0	0	0	0	0	0	0	0
198	IRWIN	0	0	0	0	0	0	0	0	0	0	0	0
199	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
200	MCCOY	0	0	0	0	0	85	0	0	0	0	0	0
201	HUNTER	0	0	0	0	0	0	0	0	0	0	0	0
202	MEADE	0	0	0	0	0	48.307045	36.692955	0	0	0	0	0
203	FT_ORD	0	0	0	0	0	0	0	0	0	0	0	0
204	F_POLK	0	0	0	0	0	0	0	85	0	0	0	0
205	RILEY	0	0	0	0	0	85	0		0	0	0	0
206	WAINWR	0	0	0	0	0	0	0	0	0	0	0	0
207	STEWRT	0	0	0	0	0	0	0	0	0	0	0	0
208	BENNING	0	0	0	0	0	0	0	0	0	0	0	0
209	BLISS	0	0	0	0	0	0	0	0	0	0	0	0
210	FT_DIX	0	0	0	0	0	0	0	0	0	0	0	0
211	EUSTIS	0	0	0	0	0	85	0	0	0	0	0	0
212	GORDON	0	0	0	0	0	0	85	0	0	0	0	0
213	HUACHU	0	0	0	0	85	0	0	0	0	0	0	0
214	JACKSN	0	0	0	0	85	0	0	0	0	0	0	0
215	F_KNOX	0	0	0	0	0	0	85	0	0	0	0	0
216	LEAVEN	0	0	0	0	0	0	85	0	0	0	0	0
217	FT_LEE	0	0	0	0	0	85	0	0	0	0	0	0
218	RUCKER	0	0	0	0	0	85	0	0	0	0	0	0
219	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
220	LEN_WD	0	0	0	0	0	0	85	0	0	0	0	0
221	ANNIST	0	0	0	0	24.778465	0	0	0	0	0	0	0
222	CORP_C	0	0	0	0	0	0	0	0	0	0	0	0
223	FINS_S	0	0	0	0	0	63.970951	0	0	0	0	0	0
224	FORMLO	0	0	0	0	0	0	0	0	0	0	0	0
225	RED_RV	0	0	0	0	0	0	0	0	0	0	0	0
226	ROCK_I	0	0	0	0	0	0	0	0	0	0	0	0
227	TOOELE	0	0	0	0	85	0	0	0	0	0	0	0
228	WATERV	0	0	0	0	0	0	0	0	0	0	0	0
229	HO_AAP	0	0	0	0	0	0	0	0	0	0	0	0
230	LK_AAP	0	0	0	0	0	0	85	0	0	0	0	0
231	RD_AAP	0	0	0	0	0	0	0	85	0	0	0	0
232	DETROI	0	0	0	0	0	0	0	0	0	0	0	0
233	PINECUT	0	0	0	0	0	0	0	0	0	0	0	0
234	REDST	0	0	0	0	0	0	0	0	0	0	0	0
235	AMBROSE	0	0	0	0	0	0	0	0	0	0	0	0
236	FICDNY	0	0	0	0	0	0	0	0	0	0	0	0
237	W_S_HR	0	0	0	0	85	0	0	0	0	0	0	0
238	DYRICK	0	0	0	0	0	85	0	0	0	0	0	0
239	W_REED	0	0	0	0	0	85	0	0	0	0	0	0
240	SLVOTR	0	0	0	0	0	0	85	0	0	0	0	0
241													
242		Binary constraints											
243		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
244		keeps annual binary cell at 0 if segment one is 'incomplete' (has not met quantity requirement)											
245		96857.337	210545.81	347270.21	492032.45	-1.54E-05	-1.54E-05	-1.54E-05	-1.54E-05	-1.54E-05	500000	-1.54E-05	-1.54E-05
246		prevents buying segment two unless annual binary cell is 1											
247		0	0	0	0	127282.42	123760.78	121604.98	142309.06	149961	0	149961	149961
248													
249		Cumulative % investment (above the starting level) of 1st segment											
250		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
251	BRAGG	0	0	0	0	0	0	0	0	0	0	0	0
252	CAMPBE	0	0	0	0	0	0	0	0	0	0	0	0
253	CARSON	0	0	0	0	0	0	0	0	0	0	0	0
254	DEVENS	0	0	0	70.399666	70.399666	70.399666	70.399666	70.399666	70.399666	70.399666	70.399666	70.399666
255	F_DRUM	0	0	85	85	85	85	85	85	85	85	85	85
256	F_HOOD	0	0	0	85	85	85	85	85	85	85	85	85
257	S_HOUS	0	0	72.980804	85	85	85	85	85	85	85	85	85
258	IRWIN	0	85	85	85	85	85	85	85	85	85	85	85
259	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
260	MCCOY	0	0	0	0	0	0	0	0	0	0	0	0
261	HUNTER	0	0	0	85	85	85	85	85	85	85	85	85

Table E-5. EofS ECO Spreadsheet - Value View
(page 4 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
262	MONROE	0	0	0	0	0	0	0	0	0	0	0	0
263	FT_ORD	0	0	0	85	85	85	85	85	85	85	85	85
264	F_POLK	0	0	0	0	0	0	0	0	0	0	0	0
265	RILEY	0	0	0	0	0	0	0	0	0	0	0	0
266	WAINWR	0	0	0	0	0	0	0	0	0	0	0	0
267	STEWRT	0	0	85	85	85	85	85	85	85	85	85	85
268	BNNING	85	85	85	85	85	85	85	85	85	85	85	85
269	BLISS	0	20.171255	85	85	85	85	85	85	85	85	85	85
270	FT_DIX	0	85	85	85	85	85	85	85	85	85	85	85
271	EUSTIS	0	0	0	0	0	0	0	0	0	0	0	0
272	GORDON	0	0	0	0	0	0	0	0	0	0	0	0
273	HUACHU	0	0	0	0	0	0	0	0	0	0	0	0
274	JACKSN	0	0	0	0	0	0	0	0	0	0	0	0
275	F_KNOX	0	0	0	0	0	0	0	0	0	0	0	0
276	LEAVEN	0	0	0	0	0	0	0	0	0	0	0	0
277	FT_LEE	0	0	0	0	0	0	0	0	0	0	0	0
278	RUCKER	0	0	0	0	0	0	0	0	0	0	0	0
279	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
280	LEN_WD	0	0	0	0	0	0	0	0	0	0	0	0
281	ANNIST	0	0	0	0	60.221531	60.221531	60.221531	60.221531	60.221531	60.221531	60.221531	60.221531
282	CORP_C	0	0	0	0	85	85	85	85	85	85	85	85
283	PINE_B	0	0	0	0	21.029051	21.029051	21.029051	21.029051	21.029051	21.029051	21.029051	21.029051
284	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	0
285	RED_RV	0	0	0	85	85	85	85	85	85	85	85	85
286	ROCK_I	0	0	85	85	85	85	85	85	85	85	85	85
287	TOOELE	0	0	0	0	0	0	0	0	0	0	0	0
288	WATERV	0	0	85	85	85	85	85	85	85	85	85	85
289	HQ_AAP	0	0	0	85	85	85	85	85	85	85	85	85
290	LK_AAP	0	0	0	0	0	0	0	0	0	0	0	0
291	RD_AAP	0	0	0	0	0	0	0	0	0	0	0	0
292	DETROI	85	85	85	85	85	85	85	85	85	85	85	85
293	MNCOT	85	85	85	85	85	85	85	85	85	85	85	85
294	PRSDT	0	85	85	85	85	85	85	85	85	85	85	85
295	ABRDN	12.853145	85	85	85	85	85	85	85	85	85	85	85
296	PICTNY	85	85	85	85	85	85	85	85	85	85	85	85
297	W_S_MR	0	0	0	0	0	0	0	0	0	0	0	0
298	OTHXXX	0	0	0	0	0	0	0	0	0	0	0	0
299	W_REED	0	0	0	0	0	0	0	0	0	0	0	0
300	SLUCIA	0	0	0	0	0	0	0	0	0	0	0	0
301													
302													
303													
304													
305													
306													
307													
308		Cumulative % investment of both segments											
309													
310		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
311	BRAGG	0	0	0	0	85	85	85	85	85	85	85	85
312	CAMPBL	0	0	0	0	85	85	85	85	85	85	85	85
313	CARSON	0	0	0	0	0	0	27.431328	85	85	85	85	85
314	DEVENS	0	0	0	70.399666	85	85	85	85	85	85	85	85
315	F_DRUM	0	0	85	85	85	85	85	85	85	85	85	85
316	F_HOOD	0	0	0	85	85	85	85	85	85	85	85	85
317	S_HOUS	0	0	72.980804	85	85	85	85	85	85	85	85	85
318	IRWIN	0	85	85	85	85	85	85	85	85	85	85	85
319	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
320	MCCOY	0	0	0	0	0	85	85	85	85	85	85	85
321	MCPHER	0	0	0	85	85	85	85	85	85	85	85	85
322	MONROE	0	0	0	0	0	48.307046	85	85	85	85	85	85
323	FT_ORD	0	0	0	85	85	85	85	85	85	85	85	85
324	F_POLK	0	0	0	0	0	0	0	85	85	85	85	85
325	RILEY	0	0	0	0	0	85	85	85	85	85	85	85
326	WAINWR	0	0	0	0	0	0	0	0	0	0	0	0
327	STEWRT	0	0	85	85	85	85	85	85	85	85	85	85
328	BNNING	85	85	85	85	85	85	85	85	85	85	85	85
329	BLISS	0	20.171255	85	85	85	85	85	85	85	85	85	85
330	FT_DIX	0	85	85	85	85	85	85	85	85	85	85	85
331	EUSTIS	0	0	0	0	0	85	85	85	85	85	85	85
332	GORDON	0	0	0	0	0	0	85	85	85	85	85	85
333	HUACHU	0	0	0	0	85	85	85	85	85	85	85	85
334	JACKSN	0	0	0	0	85	85	85	85	85	85	85	85
335	F_KNOX	0	0	0	0	0	0	85	85	85	85	85	85
336	LEAVEN	0	0	0	0	0	0	85	85	85	85	85	85
337	FT_LEE	0	0	0	0	0	85	85	85	85	85	85	85
338	RUCKER	0	0	0	0	0	85	85	85	85	85	85	85
339	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
340	LEN_WD	0	0	0	0	0	0	85	85	85	85	85	85
341	ANNIST	0	0	0	0	85	85	85	85	85	85	85	85
342	CORP_C	0	0	0	0	85	85	85	85	85	85	85	85
343	PINE_B	0	0	0	0	21.029051	85	85	85	85	85	85	[illegible]
344	PUEBLO	0	0	0	0	0	0	0	0	0	0	0	
345	RED_RV	0	0	0	85	85	85	85	85	85	85	85	[illegible]
346	ROCK_I	0	0	85	85	85	85	85	85	85	85	85	85
347	TOOELE	0	0	0	0	85	85	85	85	85	85	85	85
348	WATERV	0	0	85	85	85	85	85	85	85	85	85	85

Table E-5. EofS ECO Spreadsheet - Value View
(page 5 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
349	HD_AAP	0	0	0	85	85	85	85	85	85	85	85	85
350	LK_AAP	0	0	0	0	0	0	85	85	85	85	85	85
351	RD_AAP	0	0	0	0	0	0	0	85	85	85	85	85
352	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
353	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
354	[illegible]	0	85	85	85	85	85	85	85	85	85	85	85
355	[illegible]	12.853146	85	85	85	85	85	85	85	85	85	85	85
356	[illegible]	85	85	85	85	85	85	85	85	85	85	85	85
357	[illegible]	0	0	0	0	85	85	85	85	85	85	85	85
358	[illegible]	0	0	0	0	0	85	85	85	85	85	85	85
359	[illegible]	0	0	0	0	0	85	85	85	85	85	85	85
360	[illegible]	0	0	0	0	0	0	85	85	85	85	85	85
361													
362													
363		Cumulative Quantity (above the starting level) of 1st segment											
364													
365		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
366			sumproduct formulas are used in next row										
367		98857.337	210546.81	347270.21	492032.46	500000	500000	500000	500000	500000	500000	500000	500000
368		Upper bound on 1st segment total											
369		1.54E-06											
370													
371		Annual implementation costs											
372		in 1000s of dollars											
373		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
374			sumproduct formulas are used in next two rows										
375	1st segment	12497.758	14971.668	17257.061	19364.357	963.50095	0	0	0	0	0	0	0
376	2nd unreduc	0	0	0	0	22698.578	26200.216	28356.02	7651.9392	0	0	0	0
377	1st+red 2n	12497.758	14971.668	17257.061	19364.357	21322.221	23580.194	25520.418	6886.7453	0	0	0	0
378	(1000s of dollars)												
379		The total (1st + reduced 2nd) annual costs are used in links,											
380		i.e in (annual budget) formulas on the other worksheet											
381													
382													
383		Annual Cost Savings											
384		in 1000s of dollars											
385		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
386			sumproduct formulas are used in next row										
387	Total	7422.4726	14279.338	20601.859	26686.057	33250.634	39071.888	44791.987	46009.607	46009.607	46009.607	46009.607	46009.607
388													
389													
390													
391													
392													
393		Annual Energy Savings											
394		in 1000s of MBtu s											
395		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
396			sumproduct formulas are used in next row										
397	Total	129.98126	279.97644	478.52401	688.09737	912.38427	1181.9098	1487.1975	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291
398													
399													
400													
401													
402													
403		Annual Demand Savings											
404		in kilowatts											
405		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
406			sumproduct formulas are used in next row										
407	Total	12397.739	26949.894	44430.587	62080.154	84933.336	110281.4	136671.06	143811.66	143811.66	143811.66	143811.66	143811.66
408													
409													
410													
411													
412													
413		Annual Environmental Savings											
414		in short tons											
415		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
416			sumproduct formulas are used in next row										
417	Total	26301.897	58207.588	103566.87	148361.19	209917.87	275688.03	356073.01	378290.4	378290.4	378290.4	378290.4	378290.4
418													
419													
420													
421													
422													
423													
424													
425		Postprocessor											
426		Data and Formulas below are not sent to the optimizer											
427		Data:	Logic:	Logic:									
428		Quantity	Percent	Quantity									
429		Fixtures/	fy93	fy93									
430		Opportuni	Penetrati	Penetration			Grand Totals						
431	[illegible]	56735	15	8510.25		Cost Sav	418153.27	1000s of dollars					
432	[illegible]	37340	15	5601		Energy Sav	12780.228	1000s of MBtu s					
433	[illegible]	43761.667	15	6564.25		Demand Sav	1197722.4	kilowatts					
434	[illegible]	41043.333	15	6156.5		Environ Sav	3089775.5	short tons					
435	[illegible]	31103.333	15	4665.5									

Table E-5. EofS ECO Spreadsheet - Value View (page 6 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
436	P_HOOD	56125	15	8418.75									
437	S_HOUS	45721.667	15	6858.25									
438	IRWIN	11573.333	15	1736									
439	LEWIS	0	100	0									
440	MCCOY	24231.667	15	3634.75									
441	MCPHER	28303.333	15	4245.5									
442	MEADE	30286.667	15	4543									
443	FT_ORD	35536.667	15	5330.5									
444	F_POLK	30905	15	4635.75									
445	RILEY	36563.333	15	5484.5									
446	WAINWR	0	100	0									
447	STWART	25375	15	3806.25									
448	BRAGG	53783.333	15	8067.5									
449	BLISS	58135	15	8720.25									
450	FT_DIX	28385	15	4257.75									
451	EUSTIS	31080	15	4662									
452	GORDON	51566.667	15	7735									
453	HUACHU	29295	15	4394.25									
454	JACKSN	38640	15	5796									
455	F_KNOX	53433.333	15	8015									
456	LEAVEN	27020	15	4053									
457	FT_LEE	32865	15	4929.75									
458	RUCKER	37193.333	15	5579									
459	F_SILL	0	100	0									
460	LEN_WD	42093.333	15	6314									
461	ANNIST	4375	15	656.25									
462	CORP_C	5460	15	819									
463	FDRL_B	3290	15	493.5									
464	PUEBLO	0	100	0									
465	RED_RV	5670	15	850.5									
466	ROCK_I	17721.667	15	2658.25									
467	TOOELE	5471.6667	15	820.75									
468	WATERV	3056.6667	15	458.5									
469	HO_AAP	4235	15	635.25									
470	LS_AAP	886.66667	15	133									
471	RD_AAP	5086.6667	15	763									
472	DETROI	12355	15	1853.25									
473	MNMOUT	25223.333	15	3783.5									
474	REDST	39386.667	15	5908									
475	ABERDE	47845	15	7176.75									
476	PICTNY	15353.333	15	2303									
477	W_S_MR	15995	15	2399.25									
478	DTRICK	5145	15	771.75									
479	W_REED	46211.667	15	6931.75									
480	BLACKR	40355	15	6053.25									
481													
482													
483													
484													
485													
486													
487													
488													
489		Cumulative quantity penetration above the fy93 penetration											
490		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05
491	BNKS	0	0	0	0	0	0	0	0	0	0	0	0
492	CMPBEL	0	0	0	0	0	0	0	0	0	0	0	0
493	CARSON	0	0	0	0	0	0	0	0	0	0	0	0
494	DEVENS	0	0	0	28894.37	28894.37	28894.37	28894.37	28894.37	28894.37	28894.37	28894.37	28894.37
495	F_DRUM	0	0	28437.833	28437.833	28437.833	28437.833	28437.833	28437.833	28437.833	28437.833	28437.833	28437.833
496	F_HOOD	0	0	0	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25	47689.25
497	S_HOUS	0	0	33368.04	38863.416	38863.416	38863.416	38863.416	38863.416	38863.416	38863.416	38863.416	38863.416
498	IRWIN	0	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333	9837.3333
499	LEWIS	0	0	0	0	0	0	0	0	0	0	0	0
500	MCCOY	0	0	0	0	0	0	0	0	0	0	0	0
501	MCPHER	0	0	0	24087.833	24087.833	24087.833	24057.833	24057.833	24057.833	24057.833	24057.833	24057.833
502	MEADE	0	0	0	0	0	0	0	0	0	0	0	0
503	FT_ORD	*0	0	0	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167	30206.167
504	F_POLK	0	0	0	0	0	0	0	0	0	0	0	0
505	RILEY	0	0	0	0	0	0	0	0	0	0	0	0
506	WAINWR	0	0	0	0	0	0	0	0	0	0	0	0
507	STWART	0	0	21568.75	21568.75	21568.75	21568.75	21568.75	21568.75	21568.7	21568.75	21568.75	21568.75
508	BRAGG	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833	45715.833
509	BLISS	0	11726.558	49414.749	49414.749	49414.749	49414.749	49414.749	49414.749	49414.749	49414.749	49414.749	49414.749
510	FT_DIX	0	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25	24127.25
511	EUSTIS	0	0	0	0	0	0	0	0	0	0	0	0
512	GORDON	0	0	0	0	0	0	0	0	0	0	0	0
513	HUACHU	0	0	0	0	0	0	0	0	0	0	0	0
514	JACKSN	0	0	0	0	0	0	0	0	0	0	0	0
515	F_KNOX	0	0	0	0	0	0	0	0	0	0	0	0
516	LEAVEN	0	0	0	0	0	0	0	0	0	0	0	0
517	FT_LEE	0	0	0	0	0	0	0	0	0	0	0	0
518	RUCKER	0	0	0	0	0	0	0	0	0	0	0	0
519	F_SILL	0	0	0	0	0	0	0	0	0	0	0	0
520	LEN_WD	0	0	0	0	0	0	0	0	0	0	0	0
521	ANNIST	0	0	0	0	2634.692	2634.692	2634.692	2634.692	2634.692	2634.692	2634.692	2634.692
522	CORP_C	0	0	0	0	4641	4641	4641	4641	4641	4641	4641	4641

Table E-5. EofS ECO Spreadsheet - Value View (page 7 of 7 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M
$23	FDNE_B	0	0	0	0	691.85577	691.85577	691.85577	691.85577	691.85577	691.85577	691.85577	691.85577
$24	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
$25	MED_INV	0	0	0	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5	4819.5
$26	ROCK_I	0	0	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417	15063.417
$27	TOOLS	0	0	0	0	0	0	0	0	0	0	0	0
$28	[illegible]	0	0	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667	2598.1667
$29	NO_AAP	0	0	0	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75	3599.75
$30	UR_AAP	0	0	0	0	0	0	0	0	0	0	0	0
$31	RD_AAP	0	0	0	0	0	0	0	0	0	0	0	0
$32	[illegible]	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75	10501.75
$33	[illegible]	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833	21439.833
$34	[illegible]	0	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667	33478.667
$35	[illegible]	6149.5871	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251	40668.251
$36	[illegible]	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333	13050.333
$37	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
$38	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
$39	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
$40	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0
$41													
$42													
$43		Quantity											
$44		fy93											
$45		Penetration											
$46		by ECO											
$47		198269.75											
$48													
$49		Cumulative quantity penetration by ECO above the fy93 penetration											
$50		98887.337	210545.[illegible]	347270.21	492032.45	500000	500000	500000	500000	500000	500000	500000	500000
$51													
$52													
$53		Cumulative quantity penetration by ECO											
$54		fy94	fy95	fy96	fy97	fy98	fy99						
$55		295127.09	408815.56	546539.96	690302.2	698269.75	698269.75	698269.75	698269.75	698269.75	698269.75	698269.75	698269.75
$56													
$57	end												

Table E-6. EofS ECO Spreadsheet - Formula View
(page 1 of 7 pages)

	A	B	C	D	H
1		2X4FL	2x4 Fluorescent Lighting Retrofit		REC
2		Col B: Costs in 1000s of dollars			
3		Col C: Energy savings in 1000s of MBtu's			
4		Col D: Demand savings in Kilowatts			
5		Col E: Environmental Savings in Tons			
6		Col F: Quantity in no of items or sq ft			
7		note: Col H has formulas			
8		Data for 1% investment			Investmnt
9	$ Char	Init_Cost	Annual	Annual	%_Limit
10	Code N	1% Invest	Energy_Sv	Demand_Sv	Basis
11	BRAGG	0	0	0	=G11-M311
12	CHAFEE	0	0	0	=G12-M312
13	CARSON	0	0	0	=G13-M313
14	CMPBEL	0	0	0	=G14-M314
15	F_DRUM	0	0	0	=G15-M315
16	F_HOOD	0	0	0	=G16-M316
17	S_HOUS	0	0	0	=G17-M317
18	IRWIN	0	0	0	=G18-M318
19	LEWIS	0	0	0	=G19-M319
20	MCCOY	0	0	0	=G20-M320
21	McPHER	0	0	0	=G21-M321
22	HENGE	0	0	0	=G22-M322
23	FT_ORD	0	0	0	=G23-M323
24	F_POLK	0	0	0	=G24-M324
25	RILEY	0	0	0	=G25-M325
26	WAINWR	0	0	0	=G26-M326
27	STEWRT	0	0	0	=G27-M327
28	BENNG	0	0	0	=G28-M328
29	BLISS	0	0	0	=G29-M329
30	FT_DIX	0	0	0	=G30-M330
31	CURTIS	0	0	0	=G31-M331
32	GORDON		0	0	=G32-M332
33	HUACHU	0	0	0	=G33-M333
34	JACKSN	0	0	0	=G34-M334
35	F_KNOX	0	0	0	=G35-M335
36	LEAVEN	0	0	0	=G36-M336
37	FT_LEE	0	0	0	=G37-M337
38	MCCLEL	0	0	0	=G38-M338
39	F_SILL	0	0	0	=G39-M339
40	USMA	0	0	0	=G40-M340
41	ANNIST	0	0	0	=G41-M341
42	CORP_C	0	0	0	=G42-M342
43	PINE_B	0	0	0	=G43-M343
44	PUEBLO	0	0	0	=G44-M344
45	RED_RV	0	0	0	=G45-M345
46	ROCK_I	0	0	0	=G46-M346
47	TOOELE	0	0	0	=G47-M347
48	WATERV	0	0	0	=G48-M348
49	HO_AAP	0	0	0	=G49-M349
50	LK_AAP	0	0	0	=G50-M350
51	RD_AAP	0	0	0	=G51-M351
52	DETROT	0	0	0	=G52-M352
53	HACKUT	0	0	0	=G53-M353
54	REDST	0	0	0	=G54-M354
55	ABERDN	0	0	0	=G55-M355
56	PICTNY	0	0	0	=G56-M356
57	W_S_MR	0	0	0	=G57-M357
58	DTRICK	0	0	0	=G58-M358
59	W_REED	0	0	0	=G59-M359
60	SELVOR	0	0	0	=G60-M360
61		The next row contains formulas that are nc			
62	sums	=SUM(B11:B60)	=SUM(C11:C60)	=SUM(D11:D60)	
63		Below: Col B. Quantity of 1st seq.(unreduc			
64		Col D. Big constant for binary oc			
65		0	0	0	
66			(Big constant can be full ECO investment		
67			in no roll-over case it could be annual bu		
68		Data: Annual Cost Savings (1% inves			
69		in 1000s of dollars (Annual adjustments ar			
70		fy94	fy95	fy96	fy00
71	BRAGG	0	0	0	0
72	CHAFEE	0	0	0	0
73	CARSON	0	0	0	0
74	CMPBEL	0	0	0	0
75	F_DRUM	0	0	0	0
76	F_HOOD	0	0	0	0
77	S_HOUS	0	0	0	0
78	IRWIN	0	0	0	0
79	LEWIS	0	0	0	0
80	MCCOY	0	0	0	0
81	McPHER	0	0	0	0
82	HENGE	0	0	0	0
83	FT_ORD	0	0	0	0
84	F_POLK	0	0	0	0
85	RILEY	0	0	0	0
86	WAINWR	0	0	0	0
87	STEWRT	0	0	0	0

Table E-6. EofS ECO Spreadsheet - Formula View (page 2 of 7 pages)

	A	B	C	D	H
88	BNNING	0	0	0	0
89	BLDNS	0	0	0	0
90	FT_DIX	0	0	0	0
91	EUSTIS	0	0	0	0
92	GORDON	0	0	0	0
93	HUACHU	0	0	0	0
94	JACKSN	0	0	0	0
95	F_KNOX	0	0	0	0
96	LEAVEN	0	0	0	0
97	FT_LEE	0	0	0	0
98	RUCKER	0	0	0	0
99	F_SILL	0	0	0	0
100	LEN_WD	0	0	0	0
101	ANNIST	0	0	0	0
102	CORP_C	0	0	0	0
103	FINE_S	0	0	0	0
104	PUEBLO	0	0	0	0
105	RED_RV	0	0	0	0
106	ROCK_I	0	0	0	0
107	TOOELE	0	0	0	0
108	WATERV	0	0	0	0
109	HQ_AAP	0	0	0	0
110	LK_AAP	0	0	0	0
111	RD_AAP	0	0	0	0
112	DETROI	0	0	0	0
113	HAAQUT	0	0	0	0
114	PICTNY	0	0	0	0
115	AMMOR	0	0	0	0
116	VECTPY	0	0	0	0
117	V_S_HL	0	0	0	0
118	OTHCEX	0	0	0	0
119	V_REBD	0	0	0	0
120	BLACKOL	0	0	0	0
121		The next row contains formulas that are nc			
122	sum	=SUM(B71:B120)	=SUM(C71:C120)	=SUM(D71:D120)	=SUM(H71:H120)
123					
124		Binary Cells (must be 1 to buy 2nd a			
125		fy94	fy95	fy96	fy00
126		0	0	0	0
127					
128		Decision cells (Percent investment)			
129					
130		fy94	fy95	fy96	fy00
131	BRAGG	0	0	0	0
132	CHAFFE	0	0	0	0
133	CARSON	0	0	0	0
134	DEVENS	0	0	0	0
135	F_DRUM	0	0	0	0
136	F_HOOD	0	0	0	0
137	S_HOUS	0	0	0	0
138	IRWIN	0	0	0	0
139	LEWIS	0	0	0	0
140	MCCOY	0	0	0	0
141	HUNTER	0	0	0	0
142	MEADE	0	0	0	0
143	FT_ORD	0	0	0	0
144	F_POLK	0	0	0	0
145	RILEY	0	0	0	0
146	WAINWR	0	0	0	0
147	STEWRT	0	0	0	0
148	BNNING	0	0	0	0
149	BLDNS	0	0	0	0
150	FT_DIX	0	0	0	0
151	EUSTIS	0	0	0	0
152	GORDON	0	0	0	0
153	HUACHU	0	0	0	0
154	JACKSN	0	0	0	0
155	F_KNOX	0	0	0	0
156	LEAVEN	0	0	0	0
157	FT_LEE	0	0	0	0
158	RUCKER	0	0	0	0
159	F_SILL	0	0	0	0
160	LEN_WD	0	0	0	0
161	ANNIST	0	0	0	0
162	CORP_C	0	0	0	0
163	FINE_S	0	0	0	0
164	PUEBLO	0	0	0	0
165	RED_RV	0	0	0	0
166	ROCK_I	0	0	0	0
167	TOOELE	0	0	0	0
168	WATERV	0	0	0	0
169	HQ_AAP	0	0	0	0
170	LK_AAP	0	0	0	0
171	RD_AAP	0	0	0	0
172	DETROI	0	0	0	0
173	HAAQUT	0	0	0	0
174	PICTNY	0	0	0	0

Table E-6. EofS ECO Spreadsheet - Formula View (page 3 of 7 pages)

	A	B	C	D	H
175	AMMOR.	0	0	0	0
176	PICCNY	0	0	0	0
177	V_S_HL	0	0	0	0
178	DTKICK	0	0	0	0
179	V_RED	0	0	0	0
180	READYR	0	0	0	0
181					
182					
183					
184					
185					
186					
187					
188		Decision cells (Percent Investment) :			
189					
190		fy94	fy95	fy96	fy00
191	BRICKS	0	0	0	0
192	CNHMHR	0	0	0	0
193	CARSON	0	0	0	27.43132782
194	DEVENS	0	0	0	0
195	F_DRUM	0	0	0	0
196	F_HOOD	0	0	0	0
197	S_HOUS	0	0	0	0
198	IRWIN	0	0	0	0
199	LEWIS	0	0	0	0
200	MCCOY	0	0	0	0
201	MCPHER	0	0	0	0
202	MEADE	0	0	0	36.69295502
203	FT_CRD	0	0	0	0
204	F_POLK	0	0	0	0
205	KELLY	0	0	0	0
206	VANFRE	0	0	0	0
207	STEWRT	0	0	0	0
208	BNNING	0	0	0	0
209	BLISS	0	0	0	0
210	FT_DIX	0	0	0	0
211	SUITLE	0	0	0	0
212	CORSON	0	0	0	65
213	HUACHU	0	0	0	0
214	JACKSN	0	0	0	0
215	F_KNOX	0	0	0	65
216	LEONWD	0	0	0	65
217	FT_LEE	0	0	0	0
218	RUCKER	0	0	0	0
219	F_SILL	0	0	0	0
220	LEN_WD	0	0	0	65
221	ANNIST	0	0	0	0
222	CORP_C	0	0	0	0
223	PINE_B	0	0	0	0
224	PUEBLO	0	0	0	0
225	RED_RV	0	0	0	0
226	ROCK_I	0	0	0	0
227	TOOELE	0	0	0	0
228	WATERV	0	0	0	0
229	IO_AAP	0	0	0	0
230	LK_AAP	0	0	0	65
231	RD_AAP	0	0	0	0
232	DETROI	0	0	0	0
233	HAWOUT	0	0	0	0
234	REDST	0	0	0	0
235	AMMOR	0	0	0	0
236	PICCNY	0	0	0	0
237	W_S_HL	0	0	0	0
238	DTKICK	0	0	0	0
239	W_RED	0	0	0	0
240	READYR	0	0	0	65
241					
242		Binary constraints			
243		fy94	fy95	fy96	fy00
244		keeps annual binary cell at 0 if segment or			
245		=B307-$B$65*B126	=C307-$B$65*C126	=D307-$B$65*D126	=H307-$B$65*H126
246		prevents buying se..ent two unless annua			
247		=$D$65*B126-B376	=$D$65*C126-C376	=$D$65*D126-D376	=$D$65*H126-H376
248					
249		Cumulative % investment (above the			
250		fy94	fy95	fy96	fy00
251	BRICKS	=B131	=B251+C131	=C251+D131	=G251+H131
252	CNHMHR	=B132	=B252+C132	=C252+D132	=G252+H132
253	CARSON	=B133	=B253+C133	=C253+D133	=G253+H133
254	DEVENS	=B134	=B254+C134	=C254+D134	=G254+H134
255	F_DRUM	=B135	=B255+C135	=C255+D135	=G255+H135
256	F_HOOD	=B136	=B256+C136	=C256+D136	=G256+H136
257	S_HOUS	=B137	=B257+C137	=C257+D137	=G257+H137
258	IRWIN	=B138	=B258+C138	=C258+D138	=G258+H138
259	LEWIS	=B139	=B259+C139	=C259+D139	=G259+H139
260	MCCOY	=B140	=B260+C140	=C260+D140	=G260+H140
261	MCPHER	=B141	=B261+C141	=C261+D141	=G261+H141

Table E-6. EofS ECO Spreadsheet - Formula View (page 4 of 7 pages)

	A	B	C	D	H
262	MEADE	=B142	=B262+C142	=C262+D142	=G262+H142
263	PT_ORD	=B143	=B263+C143	=C263+D143	=G263+H143
264	P_POLK	=B144	=B264+C144	=C264+D144	=G264+H144
265	RILEY	=B145	=B265+C145	=C265+D145	=G265+H145
266	WAINWR	=B146	=A266+C146	=C266+D146	=G266+H146
267	STEWRT	=B147	=B267+C147	=C267+D147	=G267+H147
268	BENNNG	=B148	=B268+C148	=C268+D148	=G268+H148
269	BLISS	=B149	=B269+C149	=C269+D149	=G269+H149
270	PT_DIX	=B150	=B270+C150	=C270+D150	=G270+H150
271	EUSTIS	=B151	=B271+C151	=C271+D151	=G271+H151
272	GORDON	=B152	=B272+C152	=C272+D152	=G272+H152
273	HUACHU	=B153	=B273+C153	=C273+D153	=G273+H153
274	JACKSN	=B154	=B274+C154	=C274+D154	=G274+H154
275	P_KNOX	=B155	=B275+C155	=C275+D155	=G275+H155
276	LEAVWN	=B156	=B276+C156	=C276+D156	=G276+H156
277	PT_LEE	=B157	=B277+C157	=C277+D157	=G277+H157
278	RUCKER	=B158	=B278+C158	=C278+D158	=G278+H158
279	P_SILL	=B159	=B279+C159	=C279+D159	=G279+H159
280	LEN_WD	=B160	=B280+C160	=C280+D160	=G280+H160
281	ANNIST	=B161	=B281+C161	=C281+D161	=G281+H161
282	CORP_C	=B162	=B282+C162	=C282+D162	=G282+H162
283	PINE_B	=B163	=B283+C163	=C283+D163	=G283+H163
284	PUEBLO	=B164	=B284+C164	=C284+D164	=G284+H164
285	RED_RV	=B165	=B285+C165	=C285+D165	=G285+H165
286	ROCK_I	=B166	=B286+C166	=C286+D166	=G286+H166
287	TOOELE	=B167	=B287+C167	=C287+D167	=G287+H167
288	WATERV	=B168	=B288+C168	=C288+D168	=G288+H168
289	HQ_AAP	=B169	=B289+C169	=C289+D169	=G289+H169
290	LK_AAP	=B170	=B290+C170	=C290+D170	=G290+H170
291	RD_AAP	=B171	=B291+C171	=C291+D171	=G291+H171
292	DETROI	=B172	=B292+C172	=C292+D172	=G292+H172
293	[illegible]	=B173	=B293+C173	=C293+D173	=G293+H173
294	REDSTN	=B174	=B294+C174	=C294+D174	=G294+H174
295	ABERDN	=B175	=B295+C175	=C295+D175	=G295+H175
296	PICTNY	=B176	=B296+C176	=C296+D176	=G296+H176
297	W_S_MR	=B177	=B297+C177	=C297+D177	=G297+H177
298	DTRICK	=B178	=B298+C178	=C298+D178	=G298+H178
299	W_REED	=B179	=B299+C179	=C299+D179	=G299+H179
300	[illegible]	=B180	=B300+C180	=C300+D180	=G300+H180
301					
302					
303					
304					
305					
306					
307					
308		Cumulative % investment of both as			
309					
310		fy94	fy95	fy96	fy00
311	BRAGG	=B131+B191	=B311+C131+C191	=C311+D131+D191	=G311+H131+H191
312	CAMPBL	=B132+B192	=B312+C132+C192	=C312+D132+D192	=G312+H132+H192
313	CARSON	=B133+B193	=B313+C133+C193	=C313+D133+D193	=G313+H133+H193
314	DEVENS	=B134+B194	=B314+C134+C194	=C314+D134+D194	=G314+H134+H194
315	F_DRUM	=B135+B195	=B315+C135+C195	=C315+D135+D195	=G315+H135+H195
316	F_HOOD	=B136+B196	=B316+C136+C196	=C316+D136+D196	=G316+H136+H196
317	S_HOUS	=B137+B197	=B317+C137+C197	=C317+D137+D197	=G317+H137+H197
318	IRWIN	=B138+B198	=B318+C138+C198	=C318+D138+D198	=G318+H138+H198
319	LEWIS	=B139+B199	=B319+C139+C199	=C319+D139+D199	=G319+H139+H199
320	MCCOY	=B140+B200	=B320+C140+C200	=C320+D140+D200	=G320+H140+H200
321	[illegible]	=B141+B201	=B321+C141+C201	=C321+D141+D201	=G321+H141+H201
322	MEADE	=B142+B202	=B322+C142+C202	=C322+D142+D202	=G322+H142+H202
323	PT_ORD	=B143+B203	=B323+C143+C203	=C323+D143+D203	=G323+H143+H203
324	P_POLK	=B144+B204	=B324+C144+C204	=C324+D144+D204	=G324+H144+H204
325	RILEY	=B145+B205	=B325+C145+C205	=C325+D145+D205	=G325+H145+H205
326	WAINWR	=B146+B206	=B326+C146+C206	=C326+D146+D206	=G326+H146+H206
327	STEWRT	=B147+B207	=B327+C147+C207	=C327+D147+D207	=G327+H147+H207
328	BENNNG	=B148+B208	=B328+C148+C208	=C328+D148+D208	=G328+H148+H208
329	BLISS	=B149+B209	=B329+C149+C209	=C329+D149+D209	=G329+H149+H209
330	PT_DIX	=B150+B210	=B330+C150+C210	=C330+D150+D210	=G330+H150+H210
331	EUSTIS	=B151+B211	=B331+C151+C211	=C331+D151+D211	=G331+H151+H211
332	GORDON	=B152+B212	=B332+C152+C212	=C332+D152+D212	=G332+H152+H212
333	HUACHU	=B153+B213	=B333+C153+C213	=C333+D153+D213	=G333+H153+H213
334	JACKSN	=B154+B214	=B334+C154+C214	=C334+D154+D214	=G334+H154+H214
335	P_KNOX	=B155+B215	=B335+C155+C215	=C335+D155+D215	=G335+H155+H215
336	LEAVWN	=B156+B216	=B336+C156+C216	=C336+D156+D216	=G336+H156+H216
337	PT_LEE	=B157+B217	=B337+C157+C217	=C337+D157+D217	=G337+H157+H217
338	RUCKER	=B158+B218	=B338+C158+C218	=C338+D158+D218	=G338+H158+H218
339	P_SILL	=B159+B219	=B339+C159+C219	=C339+D159+D219	=G339+H159+H219
340	LEN_WD	=B160+B220	=B340+C160+C220	=C340+D160+D220	=G340+H160+H220
341	ANNIST	=B161+B221	=B341+C161+C221	=C341+D161+D221	=G341+H161+H221
342	CORP_C	=B162+B222	=B342+C162+C222	=C342+D162+D222	=G342+H162+H222
343	PINE_B	=B163+B223	=B343+C163+C223	=C343+D163+D223	=G343+H163+H223
344	PUEBLO	=B164+B224	=B344+C164+C224	=C344+D164+D224	=G344+H164+H224
345	RED_RV	=B165+B225	=B345+C165+C225	=C345+D165+D225	=G345+H165+H225
346	ROCK_I	=B166+B226	=B346+C166+C226	=C346+D166+D226	=G346+H166+H226
347	TOOELE	=B167+B227	=B347+C167+C227	=C347+D167+D227	=G347+H167+H227
348	WATERV	=B168+B228	=B348+C168+C228	=C348+D168+D228	=G348+H168+H228

Table E-6. EofS ECO Spreadsheet - Formula View (page 5 of 7 pages)

	A	B	C	D	H
349	IO_AAP	=B169+B229	=B349+C169+C229	=C349+D169+D229	=G349+H169+H229
350	LR_AAP	=B170+B230	=B350+C170+C230	=C350+D170+D230	=G350+H170+H230
351	SD_AAP	=B171+B231	=B351+C171+C231	=C351+D171+D231	=G351+H171+H231
352	[illegible]	=B172+B232	=B352+C172+C232	=C352+D172+D232	=G352+H172+H232
353	[illegible]	=B173+B233	=B353+C173+C233	=C353+D173+D233	=G353+H173+H233
354	[illegible]	=B174+B234	=B354+C174+C234	=C354+D174+D234	=G354+H174+H234
355	[illegible]	=B175+B235	=B355+C175+C235	=C355+D175+D235	=G355+H175+H235
356	[illegible]	=B176+B236	=B356+C176+C236	=C356+D176+D236	=G356+H176+H236
357	[illegible]	=B177+B237	=B357+C177+C237	=C357+D177+D237	=G357+H177+H237
358	[illegible]	=B178+B238	=B358+C178+C238	=C358+D178+D238	=G358+H178+H238
359	[illegible]	=B179+B239	=B359+C179+C239	=C359+D179+D239	=G359+H179+H239
360	[illegible]	=B180+B240	=B360+C180+C240	=C360+D180+D240	=G360+H180+H240
361					
362					
363		Cumulative Quantity (above the stat			
364					
365		fy94	fy95	fy96	fy00
366			sumproduct formulas are used in ne		
367		=SUMPRODUCT($F11:$F60,B251:B300)	=SUMPRODUCT($F11:$F60,C251:C300)	=SUMPRODUCT($F11:$F60,D251:D300)	=SUMPRODUCT($F11:$F60,H251:H300)
368		Upper bound on 1st segment total			
369		=B66-M367			
370					
371		Annual implementation costs			
372		in 1000s of dollars			
373		fy94	fy95	fy96	fy00
374			sumproduct formulas are used in ne		
375	1st seg	=SUMPRODUCT($B11:$B60,B131:B180)	=SUMPRODUCT($B11:$B60,C131:C180)	=SUMPRODUCT($B11:$B60 131:D180)	=SUMPRODUCT($B11:$B60,H131:H180)
376	2nd unr	=SUMPRODUCT($B11:$B60,B191:B240)	=SUMPRODUCT($B11:$B60,C191:C240)	=SUMPRODUCT($B11:$B60 .191:D240)	=SUMPRODUCT($B11:$B60,H191:H240)
377	1st+rdct	=B375+$C$6*B376	=C375+$C$6*C376	=D375+$C$6*D376	=H375+$C$6*H376
378	(1000s				
379		The total (1st + reduced 2nd) annual costs			
380		i.e in (annual budget) formulas on another			
381					
382					
383		Annual Cost Savings			
384		in 1000s of dollars			
385		fy94	fy95	fy96	fy00
386			sumproduct formulas are used in ne		
387	Total	=SUMPRODUCT(B71:B120,B311:B360)	=SUMPRODUCT(C71:C120,C311:C360)	=SUMPRODUCT(D71:D120,D311:D360)	=SUMPRODUCT(H71:H120,H311:H360)
388					
389					
390					
391					
392					
393		Annual Energy Savings			
394		in 1000s of MBtu's			
395		fy94	fy95	fy96	fy00
396			sumproduct formulas are used in ne		
397	Total	=SUMPRODUCT($C11:$C60,B311:B360)	=SUMPRODUCT($C11:$C60,C311:C360)	=SUMPRODUCT($C11:$C60,D311:D360)	=SUMPRODUCT($C11:$C60,H311:H360)
398					
399					
400					
401					
402					
403		Annual Demand Savings			
404		in kilowatts			
405		fy94	fy95	fy96	fy00
406			sumproduct formulas are used in ne		
407	Total	=SUMPRODUCT($D11:$D60,B311:B360)	=SUMPRODUCT($D11:$D60,C311:C360)	=SUMPRODUCT($D11:$D60,D311:D360)	=SUMPRODUCT($D11:$D60,H311:H360)
408					
409					
410					
411					
412					
413		Annual Environmental Savings			
414		in short tons			
415		fy94	fy95	fy96	fy00
416			sumproduct formulas are used in ne		
417	Total	=SUMPRODUCT($E11:$E60,B311:B360)	=SUMPRODUCT($E11:$E60,C311:C360)	=SUMPRODUCT($E11:$E60,D311:D360)	=SUMPRODUCT($E11:$E60,H311:H360)
418					
419					
420					
421					
422					
423					
424					
425		Postprocessor			
426		Data and Formulas below are not sent to th			
427		Data:	Logic:	Logic:	
428		Quantity	Percent	Quantity	
429		Fixtures/	fy93	fy93	
430		Opportuni	Penetrati	Penetration	
431	[illegible]	0	=100-G11	=B431*C431/100	1000s of dollars
432	[illegible]	0	=100-G12	=B432*C432/100	1000s of MBtu's
433	[illegible]	0	=100-G13	=B433*C433/100	kilowatts
434	[illegible]	0	=100-G14	=B434*C434/100	short tons
435	[illegible]	0	=100-G15	=B435*C435/100	

Table E-6. EofS ECO Spreadsheet - Formula View (page 6 of 7 pages)

	A	B	C	D	H
436	F_HOOD	0	=100-G16	=B436*C436/100	
437	S_HOME	0	=100-G17	=B437*C437/100	
438	DRKGN	0	=100-G18	=B438*C438/100	
439	LBKGS	0	=100-G19	=B439*C439/100	
440	HKCOY	0	=100-G20	=B440*C440/100	
441	HUMMER	0	=100-G21	=B441*C441/100	
442	HBACK	0	=100-G22	=B442*C442/100	
443	FT_CHO	0	=100-G23	=B443*C443/100	
444	F_FOLR	0	=100-G24	=B444*C444/100	
445	RDLEY	0	=100-G25	=B445*C445/100	
446	[illegible]	0	=100-G26	=B446*C446/100	
447	STINGR	0	=100-G27	=B447*C447/100	
448	BNGNG	0	=100-G28	=B448*C448/100	
449	BLJSK	0	=100-G29	=B449*C449/100	
450	FT_DIX	0	=100-G30	=B450*C450/100	
451	SUBTEX	0	=100-G31	=B451*C451/100	
452	CONCON	0	=100-G32	=B452*C452/100	
453	HUACHU	0	=100-G33	=B453*C453/100	
454	JACKMN	0	=100-G34	=B454*C454/100	
455	F_RICK	0	=100-G35	=B455*C455/100	
456	LEVNWN	0	=100-G36	=B456*C456/100	
457	FT_LEE	0	=100-G37	=B457*C457/100	
458	RUCKER	0	=100-G38	=B458*C458/100	
459	F_SILL	0	=100-G39	=B459*C459/100	
460	LEN_WD	0	=100-G40	=B460*C460/100	
461	ANNCIT	0	=100-G41	=B461*C461/100	
462	COMP_C	0	=100-G42	=B462*C462/100	
463	PINE_B	0	=100-G43	=B463*C463/100	
464	RSBELO	0	=100-G44	=B464*C464/100	
465	RED RV	0	=100-G45	=B465*C465/100	
466	[illegible]	0	=100-G46	=B466*C466/100	
467	[illegible]	0	=100-G47	=B467*C467/100	
468	WATERV	0	=100-G48	=B468*C468/100	
469	HQ_AAP	0	=100-G49	=B469*C469/100	
470	LK_AAP	0	=100-G50	=B470*C470/100	
471	RD_AAP	0	=100-G51	=B471*C471/100	
472	[illegible]	0	=100-G52	=B472*C472/100	
473	[illegible]	0	=100-G53	=B473*C473/100	
474	[illegible]	0	=100-G54	=B474*C474/100	
475	[illegible]	0	=100-G55	=B475*C475/100	
476	PICTNY	0	=100-G56	=B476*C476/100	
477	H_S_MR	0	=100-G57	=B477*C477/100	
478	[illegible]	0	=100-G58	=B478*C478/100	
479	[illegible]	0	=100-G59	=B479*C479/100	
480	[illegible]	0	=100-G60	=B480*C480/100	
481					
482					
483					
484					
485					
486					
487					
488					
489		Cumulative quantity penetration [illegible]			
490		fy94	fy95	fy96	fy00
491	[illegible]	=B251*$B431/100	=C251*$B431/100	=D251*$B431/100	=H251*$B431/100
492	[illegible]	=B252*$B432/100	=C252*$B432/100	=D252*$B432/100	=H252*$B432/100
493	[illegible]	=B253*$B433/100	=C253*$B433/100	=D253*$B433/100	=H253*$B433/100
494	[illegible]	=B254*$B434/100	=C254*$B434/100	=D254*$B434/100	=H254*$B434/100
495	F_CRSH	=B255*$B435/100	=C255*$B435/100	=D255*$B435/100	=H255*$B435/100
496	F_HOOD	=B256*$B436/100	=C256*$B436/100	=D256*$B436/100	=H256*$B436/100
497	S_HOME	=B257*$B437/100	=C257*$B437/100	=D257*$B437/100	=H257*$B437/100
498	DRKGN	=B258*$B438/100	=C258*$B438/100	=D258*$B438/100	=H258*$B438/100
499	LBKGS	=B259*$B439/100	=C259*$B439/100	=D259*$B439/100	=H259*$B439/100
500	HKCOY	=B260*$B440/100	=C260*$B440/100	=D260*$B440/100	=H260*$B440/100
501	HUMMER	=B261*$B441/100	=C261*$B441/100	=D261*$B441/100	=H261*$B441/100
502	HBACK	=B262*$B442/100	=C262*$B442/100	=D262*$B442/100	=H262*$B442/100
503	FT_CHO	=B263*$B443/100	=C263*$B443/100	=D263*$B443/100	=H263*$B443/100
504	F_FOLR	=B264*$B444/100	=C264*$B444/100	=D264*$B444/100	=H264*$B444/100
505	RDLEY	=B265*$B445/100	=C265*$B445/100	=D265*$B445/100	=H265*$B445/100
506	[illegible]	=B266*$B446/100	=C266*$B446/100	=D266*$B446/100	=H266*$B446/100
507	STINGR	=B267*$B447/100	=C267*$B447/100	=D267*$B447/100	=H267*$B447/100
508	BNGNG	=B268*$B448/100	=C268*$B448/100	=D268*$B448/100	=H268*$B448/100
509	BLJSK	=B269*$B449/100	=C269*$B449/100	=D269*$B449/100	=H269*$B449/100
510	FT_DIX	=B270*$B450/100	=C270*$B450/100	=D270*$B450/100	=H270*$B450/100
511	SUBTEX	=B271*$B451/100	=C271*$B451/100	=D271*$B451/100	=H271*$B451/100
512	CONCON	=B272*$B452/100	=C272*$B452/100	=D272*$B452/100	=H272*$B452/100
513	HUACHU	=B273*$B453/100	=C273*$B453/100	=D273*$B453/100	=H273*$B453/100
514	JACKMN	=B274*$B454/100	=C274*$B454/100	=D274*$B454/100	=H274*$B454/100
515	F_RICK	=B275*$B455/100	=C275*$B455/100	=D275*$B455/100	=H275*$B455/100
516	LEVNWN	=B276*$B456/100	=C276*$B456/100	=D276*$B456/100	=H276*$B456/100
517	FT_LEE	=B277*$B457/100	=C277*$B457/100	=D277*$B457/100	=H277*$B457/100
518	RUCKER	=B278*$B458/100	=C278*$B458/100	=D278*$B458/100	=H278*$B458/100
519	F_SILL	=B279*$B459/100	=C279*$B459/100	=D279*$B459/100	=H279*$B459/100
520	LEN_WD	=B280*$B460/100	=C280*$B460/100	=D280*$B460/100	=H280*$B460/100
521	ANNCIT	=B281*$B461/100	=C281*$B461/100	=D281*$B461/100	=H281*$B461/100
522	COMP_C	=B282*$B462/100	=C282*$B462/100	=D282*$B462/100	=H282*$B462/100

Table E-6. EofS ECO Spreadsheet - Formula View (page 7 of 7 pages)

	A	B	C	D	H
523	FDNG_B	=B283*$B463/100	=C283*$B463/100	=D283*$B463/100	=H283*$B463/100
524	FUMRO	=B284*$B464/100	=C284*$B464/100	=D284*$B464/100	=H284*$B464/100
525	MID_BV	=B285*$B465/100	=C285*$B465/100	=D285*$B465/100	=H285*$B465/100
526	ROCK_Z	=B286*$B466/100	=C28. $B466/100	=D286*$B466/100	=H286*$B466/100
527	TOOMLE	=B287*$B467/100	=C287*$B467/100	=D287*$B467/100	=H287*$B467/100
528	MOTRRV	=B288*$B468/100	=C288*$B468/100	=D288*$B468/100	=H288*$B468/100
529	IO_AMP	=B289*$B469/100	=C289*$B469/100	=D289*$B469/100	=H289*$B469/100
530	LR_AMP	=B290*$B470/100	=C290*$B470/100	=D290*$B470/100	=H290*$B470/100
531	BD_AMP	=B291*$B471/100	=C291*$B471/100	=D291*$B471/100	=H291*$B471/100
532	[illegible]	=B292*$B472/100	=C292*$B472/100	=D292*$B472/100	=H292*$B472/100
533	MACUT	=B293*$B473/100	=C293*$B473/100	=D293*$B473/100	=H293*$B473/100
534	MICKT	=B294*$B474/100	=C294*$B474/100	=D294*$B474/100	=H294*$B474/100
535	[illegible]	=B295*$B475/100	=C295*$B475/100	=D295*$B475/100	=H295*$B475/100
536	PECRNT	=B296*$B476/100	=C296*$B476/100	=D296*$B476/100	=H296*$B476/100
537	V_S_HP	=B297*$B477/100	=C297*$B477/100	=D297*$B477/100	=H297*$B477/100
538	OTHDCK	=B298*$B478/100	=C298*$B478/100	=D298*$B478/100	=H298*$B478/100
539	V_MRD	=B299*$B479/100	=C299*$B479/100	=D299*$B479/100	=H299*$B479/100
540	BLKCTR	=B300*$B480/100	=C300*$B480/100	=D300*$B480/100	=H300*$B480/100
541					
542					
543		Quantity			
544		fy93			
545		Penetration			
546		by ECO			
547		=SUM(D431:D480)			
548					
549		Cumulative quantity penetration by E			
550		=SUM(B491:B540)	=SUM(C491:C540)	=SUM(D491:D540)	=SUM(H491:H540)
551					
552					
553		Cumulat... quantity p...etration by E			
554		fy94	fy95	fy96	
555		=$B547+B550	=$B547+C550	=$B547+D550	=$B547+H550
556					
557	end				

Table E-7. EofS Main (Linking) Spreadsheet - Value View (page 1 of 3 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1								RSC	RSC	RSC	RSC	RSC	RSC	
2														
3														
4														
5														
6														
7														
8		DATA												
9														
10		Fraction [0,1] for cost savings rolled over												
11		0.3333												
12		Annual investment funding limitations (Budget) in 1000s of dollars												
13		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
14	Budget	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	12496.758	
15														
16		Weights for Objectives												
17		CS	ES	DS	EnvirS									
18		1	0	0	0									
19														
20														
21		LOGIC												
22		Multiple Objective Function												
23		(variables with zero coeff removed)												
24		416153.27												
25														
26		Total annual investment costs												
27		12497.758	14971.668	17257.061	19364.357	21392.221	23580.194	25520.418	6886.7453	0	0	0	0	
28														
29		Total annual cost savings												
30		7422.4726	14279.338	20601.859	26686.057	33250.634	39071.888	44791.987	46009.807	46009.807	46009.807	46009.807	46009.807	
31		Grand total costs savings (1000s of dollars)												
32		416,153												
33														
34		Total annual energy savings												
35		129.99126	279.97644	478.52401	668.09737	912.38427	1181.9098	1457.1975	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	
36		Grand total energy savings (1000s of MBtus)												
37		12,780												
38														
39		Total annual demand savings												
40		12397.39	26949.864	44450.587	62980.154	84933.336	110281.4	136671.06	143811.66	143811.66	143811.66	143811.66	143811.66	
41		Grand total demand savings (kilowatts)												
42		1,197,722												
43														
44		Total annual environmental savings												
45		26301.897	58207.588	103566.87	148561.19	209917.87	275695.03	356073.01	378290.4	378290.4	378290.4	378290.4	378290.4	

Table E-7. EofS Main (Linking) Spreadsheet - Value View
(page 2 of 3 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
46		**Grand total environmental savings (stons)**												
47		3,069,775												
48														
49		**Annual budget + cost savings rolled over from previous year**												
50		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
51		see budget	14970.668	17256.061	19363.357	21391.221	23579.194	25519.418	27425.927	27831.827	27931.827	27831.827	27831.827	
52														
53		Enforcement of cost limit												
54		unused amount shown												
55		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
56		-0.999995	-1.000103	-0.999715	-0.999887	-0.999969	-0.999923	-0.99993	29533.182	27831.827	27831.827	27831.827	27831.827	
57														
58														
59		**LINKS (Refs to other spreadsheets)**												
60														
61		**Total annual investment costs by E(**												
62		(do not copy down, can copy across)												
63		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
64	F01_2X4FL	12497.758	14971.668	17257.061	19364.357	21392.221	23580.194	25520.418	6886.7453	0	0	0	0	F01
65														
66														
67														
68														
69		**Total annual cost savings by ECO**												
70		(do not copy downward, can copy across)												
71		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
72	F01_2X4FL	7422.4726	14279.338	20601.859	26686.057	33250.634	39071.888	44791.987	46009.807	46009.807	46009.807	46009.807	46009.807	F01
73														
74														
75														
76														
77		**Total annual energy savings by ECO**												
78		(do not copy downward, can copy across)												
79		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
80	F[illegible]X4FL	129.[illegible]126	279.97644	478.52401	668.09737	912.38427	1181.9098	1457.1975	1534.4291	1534.4291	1534.4291	1534.4291	1534.4291	F01
81														
82														
83														
84														
85		**Total annual demand savings by ECO**												
86		(do not copy downward, can copy across)												
87		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
88	F01_2X4FL	12397.739	26949.864	44450.587	62980.154	84933.336	110281.4	136671.06	143811.66	143811.66	143811.66	143811.66	143811.66	F01
89														
90														
91														

Table E-7. EofS Main (Linking) Spreadsheet - Value View (page 3 of 3 pages)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
92														
93		Total annual environmental savings by ECO												
94		(do not copy downward, can copy across)												
95		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
96	F01_2X4FL	26301.897	58207.588	103566.87	148561.19	209917.87	275695.03	356073.01	378290.4	378290.4	378290.4	378290.4	378290.4	F01
97														
98														
99		postprocessor												
100														
101		Cumulative quantity penetration by ECO												
102		(do not copy downward, can copy across)												
103		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
104	F01_2X4FL	295127.09	408815.56	545539.96	690302.2	698269.75	698269 75	698269.75	698269 75	698269.75	698269.75	698269.75	698269.75	F01
105														
106														
107		Cumulative quantity penetration by ECO above the fy93 penetration												
108		(do not copy downward, can copy across)												
109		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
110	F01_2X4FL	96857.337	210545.81	347270.21	492032.45	500000	500000	500000	500000	500000	500000	500000	500000	F01
111														
112														
113		Percent of Final Penetration												
114		Cum quant pen (above 93 pen) divided by last year cum quant pen (above 93 pen)												
115		(do not copy downward, can copy across)												
116		fy94	fy95	fy96	fy97	fy98	fy99	fy00	fy01	fy02	fy03	fy04	fy05	
117	F01_2X4FL	19%	42%	69%	98%	100%	100%	100%	100%	100%	100%	100%	100%	F01
118														
119														
120														

Table E-8. EofS Main (Linking) Spreadsheet - Formula View
(page 1 of 3 pages)

	A	B	C	D	E
1					
2					
3					
4					
5					
6					
7					
8		DATA			
9					
10		Fraction [0,1] for cost savings rolled over			
11		0			
12		Annual investment funding limitations (Budget) in 1000s of dollars			
13		fy94	fy95	fy96	fy97
14	Budget	0	0	0	0
15					
16		Weights for Objectives			
17		CS	ES	DS	EnvirS
18		0	0	0	0
19					
20					
21		LOGIC			
22		Multiple Objective Function			
23		(va· ·bles with zero coeff removed)			
24		=B18*B32			
25					
26		Total annual investment costs			
27		=SUM(B64:B64)	=SUM(C64:C64)	=SUM(D64:D64)	=SUM(E64:E64)
28					
29		Total annual cost savings			
30		=SUM(B72:B72)	=SUM(C72:C72)	=SUM(D72:D72)	=SUM(E72:E72)
31		Grand total costs savings (1000s of dollars)			
32		=SUM(B30:M30)			
33					
34		Total annual energy savings			
35		=SUM(B80:B80)	=SUM(C80:C80)	=SUM(D80:D80)	=SUM(E80:E80)
36		Grand total energy savings (1000s of MBtus)			
37		=SUM(B35:M35)			
38					
39		Total annual demand savings			
40		=SUM(B88:B88)	=SUM(C88:C88)	=SUM(D88:D88)	=SUM(E88:E88)
41		Grand total demand savings (kilowatts)			
42		=SUM(B40:M40)			
43					
44		Total annual environmental savings			
45		=SUM(B96:B96)	=SUM(C96:C96)	=SUM(D96:D96)	=SUM(E96:E96)

Table E-8. EofS Main (Linking) Spreadsheet - Formula View (page 2 of 3 pages)

	A	B	C	D	E
91					
92					
93		**Total annual environmental savings by ECO**			
94		(do not copy downward, can copy across)			
95		fy94	fy95	fy96	fy97
96	F01_2X4FL	='C-540:r91G01'!B$417	='C-540:r91G01'!C$417	='C-540:r91G01'!D$417	='C-540:r91G01'!E$417
97					
98					
99		**postprocessor**			
100					
101		**Cumulative quantity penetration by ECO**			
102		(do not copy downward, can copy across)			
103		fy94	fy95	fy96	fy97
104	F01_2X4FL	='C-540:r91G01'!B$555	='C-540:r91G01'!C$555	='C-540:r91G01'!D$555	='C-540:r91G01'!E$555
105					
106					
107		**Cumulative quantity penetration by ECO above the fy93 penetration**			
108		(do not copy downward, can copy across)			
109		fy94	fy95	fy96	fy97
110	F01_2X4FL	='C-540:r91G01'!B$550	='C-540:r91G01'!C$550	='C-540:r91G01'!D$550	='C-540:r91G01'!E$550
111					
112					
113		**Percent of Final Penetration**			
114		Cum quant pen (above 93 pen) divided by last year cum quant pen (above 93 p			
115		(do not copy downward, can copy across)			
116		fy94	fy95	fy96	fy97
117	F01_2X4FL	=B110/$M110	=C110/$M110	=D110/$M110	=E110/$M110
118					
119					
120					

Table E-8. EofS Main (Linking) Spreadsheet - Formula View (page 3 of 3 pages)

	A	B	C	D	E
46		Grand total environmental savings (stons)			
47		=SUM(B45:M45)			
48					
49		Annual budget + cost savings rolled over from previous year			
50		fy94	fy95	fy96	fy97
51		see budget	=C14+$B11*B30	=D14+$B11*C30	=E14+$B11*D30
52					
53		Enforcement of cost limit			
54		unused amount shown			
55		fy94	fy95	fy96	fy97
56		=B14-B27	=C51-C27	=D51-D27	=E51-E27
57					
58					
59		LINKS (Refs to other spreadsheets)			
60					
61		Total annual investment costs by ECO			
62		(do not copy down, can copy across)			
63		fy94	fy95	fy96	fy97
64	F01_2X4FL	='C-540:r91G01'!B$377	='C-540:r91G01'!C$377	='C-540:r91G01'!D$377	='C-540:r91G01'!E$377
65					
66					
67					
68					
69		Total annual cost savings by ECO			
70		(do not copy downward, can copy across)			
71		fy94	fy95	fy96	fy97
72	F01_2X4FL	='C-540:r91G01'!B$387	='C-540:r91G01'!C$387	='C-540:r91G01'!D$387	='C-540:r91G01'!E$387
73					
74					
75					
76					
77		Total annual energy savings by ECO			
78		(do not copy downward, can copy across)			
79		fy94	fy95	fy96	fy97
80	F01_2X4FL	='C-540:r91G01'!B$397	='C-540:r91G01'!C$397	='C-540:r91G01'!D$397	='C-540:r91G01'!E$397
81					
82					
83					
84					
85		Total annual demand savings by ECO			
86		(do not copy downward, can copy across)			
87		fy94	fy95	fy96	fy97
88	F01_2X4FL	='C-540:r91G01'!B$407	='C-540:r91G01'!C$407	='C-540:r91G01'!D$407	='C-540:r91G01'!E$407
89					
90					

APPENDIX F

FINANCIAL ALTERNATIVES

F–1. INTRODUCTION. Department of the Army energy conservation projects can be financed through a variety of defense and nondefense programs. This appendix identifies and describes the most popular of these energy financing mechanisms.

F–2. APPROACH. Data were collected using primary and secondary sources. Energy experts, policymakers, and funding representatives were interviewed from the Department of the Army Energy Office, US Army Engineering Division at Huntsville, US Army Corps of Engineers Housing Support Center, the Department of Energy, the General Services Administration (GSA) and industry. Points of contact from various Army installations were also contacted about their experiences with using some of the funding methods presented in this report. In addition to interviews, secondary sources such as energy legislation, defense regulations, policy letters, conference reports, books, and lessons learned notes were used to gather information. A complete list of these sources appear in the bibliography.

F–3. DEFENSE PROGRAMS

a. Defense programs fall into the categories of general defense or Office of the Secretary of Defense (OSD) and Army-specific. All programs, regardless of category, were considered "viable" funding sources even though some were not funded during the current fiscal year. The programs addressed are the Energy Conservation Investment Program (ECIP), Energy Conservation and Management (ECAM) Program, Productivity Capital Investment Program (PCIP) which includes Quick Return on Investment Program (QRIP), Productivity Enhancing Capital Investment Program (PECIP), the Strategic Environmental Research and Development Program (SERDP), Product Improvement Program (PIP) and Labor-Saving Capital Investment Program (LSCIP). A brief description of each program is given below.

(1) Energy Conservation Investment Program (ECIP). The Energy Conservation Investment Program is a Department of Defense military construction (MILCON) funded program. ECIP funds energy-saving, cost-reducing projects for existing DOD facilities. Installing cost effective retrofits for existing facilities or building new energy efficiency systems are two examples of projects which would qualify for ECIP funding. Specifically, projects must cost $300,000 or more, exhibit a savings-to-investment ratio of greater than 1.25, and amortize or have a payback of 10 years or less. Commanders submit projects to Headquarters, Department of the Army. According to Army Regulation (AR) 11–27, Army Energy Program, Army participation is planned, executed, and monitored by the Chief of Engineers and the Deputy Chief of Staff for Logistics, specifically, the Energy Office. This may change, however, with the current restructuring of the Army. The Chief, National Guard Bureau, handles requests from the Army National Guard. According to the ECIP point of contact, ECIP was funded for $50 million per year through FY 97. From this amount, the Army receives $12.8 million per year for its projects throughout FY 97. The program may receive a one-time additional funding of $50 million. If the additional funding of $50 million is approved, then the Army will receive approximately $20–25 million per year.

(2) Energy Conservation and Management (ECAM) Program. The Energy Conservation and Management Program is an Army Materiel Command program, and more specifically an Ammunition and Chemical Command (AMCCOM) program. ECAM funds energy-saving retrofit projects at government-owned, contractor-operated (GOCO) plants. ECAM is funded with Procurement of Ammunition, Army (PAA) dollars. Military Construction, Army (MCA) dollars cannot be used to fund ECAM projects with the exception

of new construction (i.e., the building of a new facility). According to an ECAM representative, to qualify for ECAM funding, projects must cost $15,000 or more, have a savings-to-investment ratio greater than 1, and have a payback period of 2 years or less. Projects are usually selected from studies conducted under the Energy Engineering Analysis Program, Production Base Modernization Program, or other Army procurement funded programs. The ECAM Program remained unfunded throughout FY 92. It is uncertain as to when funding will become available.

(3) Productivity Capital Investment Program (PCIP). The Productivity Capital Investment Program is an umbrella program which provides funding to defense agencies for energy efficiency projects and equipment improvements. Programs falling under PCIP are the OSD Productivity Investment Funding (OSD PIF) Program, QRIP, and PECIP. As of January 1991, Program Budget Decision #197 officially canceled the OSD Productivity Investment Funding Program which funded high payoff projects at non-GOCO facilities. As an outgrowth of this OSD decision, the Department of the Army decided to canceled its programs--Quick Return on Investment Program and Productivity Enhancing Capital Investment Program--as of the end of FY 93. Army agencies wishing to fund projects normally falling under these categories would now be required to request funding under other Army financing programs. Because QRIP and PECIP are viable through the end of FY 93, a brief description of them is given below.

(a) Quick Return on Investment Program (QRIP). The Quick Return on Investment Program funds projects that cost less than $10,000 and amortize or have a payback in 2 years or less. According to one QRIP point of contact, approximately 99 percent of all QRIP dollars comes from three accounts: Operation and Maintenance, Army (OMA); Other Procurement, Army (OPA); and, Research, Development, and Acquisition (RDA). OMA funds are good for 1 year, RDA are good for 2 years, and OPA for 3.

(b) Productivity Enhancing Capital Investment Program (PECIP). Projects which do not qualify for funding under OSD PIF or QRIP do qualify for funds under the Productivity Enhancing Capital Investment Program. PECIP projects must cost more than $100,000 and have a payback of 3 years or less.

(4) Strategic Environmental Research and Development Program (SERDP). Title 10, United States Code, Section 2901 (10 USC 2901) establishes the Strategic Environmental Research and Development Program. According to 10 USC 2901, SERDP brings together the Department of Defense, the Department of Energy, and the Environmental Protection Agency to conduct research and develop energy technologies and other technologies which would address environmental restoration, waste minimization, hazardous waste substitution, and other environmental concerns. SERDP encourages continuous transfer of information and technologies between the public and private sectors to enhance global environmental change. During FY 91 and FY 92, $200 million funded the program. Based on the signing of the FY 93 Defense Appropriations Bill, Congress and the current Administration showed their support to further fund SERDP in FY 93 by appropriating $180 million to the program. Efforts are underway to ensure SERDP transitions into a budgeted program.

b. Little is known about the next two programs--Labor-Saving Capital Investment Program (LSCIP) and Product Improvement Program (PIP)--however, according to AR 11-27, these programs are viable.

(1) Labor-Saving Capital Investment Program (LSCIP). According to AR 11-27, projects qualifying for the Labor-Saving Capital Investment Program cost more than $100,000. Half of the project should be recouped through manpower savings within 4 years and the total be amortized within that time.

(2) **Product Improvement Program (PIP).** According to AR 11–27, the Product Improvement Program considers and manages suggestions to improve fielded products Armywide. PIP dollars are obtained from the OMA account.

F–4. NONDEFENSE PROGRAMS

a. Other Federal and private sector financing programs are available to the Department of Defense. Discussed in this paragraph are the Department of Energy's Seed Money and the General Services Administration's Set-Aside Program (Budget Account 54). Industry, too, has pursued energy savings initiatives with the Department of the Defense, especially since the mid-to–late 1980s. Numerous programs have evolved since that time to facilitate DOD's effort in reducing its energy consumption and energy-related costs. Among the most popular programs in the defense community are Energy Savings Performance Contracting and Demand Side Management. A brief description of all these programs appears below.

(1) **Seed Money.** According to a Department of Energy representative, DOE provides Federal agencies funding for project planning and initial energy conservation audits on a cost shared basis. Usually, the customer agency receives $10K, $15K, or $20K from DOE and is required to match that amount. Although this is not an "official" program, it is available to agencies interested in implementing energy cost saving measures in their facilities as long as funding is available.

(2) **GSA Set-Aside Program (Budget Account 54).** On 2 August 1991, GSA issued a policy letter stating that it would implement an energy conservation program which would fund energy retrofit projects at delegated buildings and provide agencies with guidance to conduct long-term planning, energy audits, and life cycle costing to meet the energy reduction goals outlined in Public Law 100–615 and Executive Order 12759. Agencies wishing to compete for funds under this program would be evaluated on the following criteria:

- Project cost (must exceed $10K but total less than $1.6M to include planned nonrecurring expenditures or total less than $750K if projects are in leased buildings where the government pays utilities separately from the lease)
- Savings-to–investment ratio
- Simple payback
- Annual million British thermal units (Mbtu) Savings
- Inspection score (minimum score of 85)
- Lease status

(3) **Energy Savings Performance Contracting.** According to the Energy Policy Act (1992), an energy savings performance contract (previously referred to as Shared Energy Savings (SES)) is an arrangement or agreement between the government and a contractor to increase energy efficiency and reduce energy related operating costs of a building, group of buildings, or facility, whereby the contractor incurs the cost and provides the assets to implement energy savings measures such as performing the audit, designing the project, acquiring, installing, testing, operating, maintaining, and repairing the equipment (to include software systems) and training personnel, in exchange for a portion of the actual energy savings, if any, directly resulting from the implementation of such measures during the term of the contract which is not to exceed 25 years. In other words, the contractor provides a service to the government, finances the project (although can arrange for a third party (e.g., leasing bank) to finance the project), and is reimbursed based on the actual energy savings, if any. This last point is crucial to the understanding of energy savings performance contracts. The contractor is paid a negotiated price (a dollar amount) or a percentage or "split" of the savings incurred (i.e., 50/50, 60/40 etc.) based on a predetermined sharing formula agreed to by both parties and

stated in the contract. The contractor must prove actual energy savings each month in order to be paid. If savings are not achieved, then the contractor does not receive payment. Sometimes, however, arrangements can be made between the contractor and the government to provide payment on a more flexible basis. Under the new Energy Policy Act (1992), it is stated that the contractor can receive payment per month based on an agreed amount regardless of any savings incurred. At the end of the year, an audit is conducted to determine actual savings. If actual savings to the government are less than expected, then the contractor may pay back the difference to the government. This last condition has not yet been implemented with the Department of the Army.

(a) The following list reflects the types of energy savings performance contract projects either proposed or awarded at Army installations (see Table F-1).

- Chiller retrofits
- Electrical peak shaving plants
- Lighting retrofits
- Group coupled air source heat pumps
- Propane-air mixing plants
- Geothermal
- Utility control systems
- Air conditioning retrofits

(b) During the conduct of the study, Army representatives who were using energy savings performance contracting to finance energy projects at their installations were interviewed and asked about their experiences. Strengths and weaknesses using the energy savings performance contracting approach were identified. Easier and faster access to capital financing and increased incentive for project success in terms of energy cost savings (among the contractor and customer) were identified as the most positive aspects of the method. Obtaining manpower support; minimizing high cost overhead; considering environmental impacts (depending on type of project); and encouraging contractors to commit to a long-term relationship with defense organizations under the current down sizing effort and economic situation were identified as the most negative aspects. The US Army Corps of Engineers, Huntsville Division (Huntsville, Alabama) serves as the Center of Expertise for the Department of the Army in assisting with energy savings performance contract opportunities. Based on Huntsville's experience with assisting installations with energy savings, they wrote a paper (see bibliography) on their lessons learned. The following list is taken from that paper; it explains the barriers found with the approach.

- Few precedents to guide those who undertake SES contracting in the Army
- Lack of development of government SES contracting expertise
- Government lack of knowledge of industry concerns relative to SES contracting
- Loss of technical and contractual knowledge due to employee turnover
- Determining how the government will be able to operate the SES system if the contractor defaults
- Predetermining the government's needs at contract end
- Lack of industry interest in government SES contracts due to termination of convenience
- Providing assurances that the contractor will provide services as bid
- Ensuring customer commitment to the SES contracting effort
- Ensuring the understanding between the contractor and the government concerning the SES contract boundary
- Determining the most effective energy baseline
- Impact of perceived and actual risk on government SES contracting efforts
- Government commitment to unnecessarily lengthy SES contracts

Table F-1. Energy Savings Performance Contracts in the Army (As of April 20, 1993)

Project name/location	Project description	Contractor investment	Government projected share of savings	Contractor projected share of savings	Contract terms
Corpus Christi Army Depot Corpus Christi, TX	Chiller retrofit and upgrade of electrical service in aircraft hangar building housing aircraft paint booths, taping and touch-up bays and offices	$755,850	$3,460,791 (31.4%)	$7,572,105 (68.6%)	25 Years
Aliamanu Family Housing Area, Honolulu, HI	Chiller retrofit, EMS expansion, controls, and lighting retrofits in a family housing complex that includes a shopette/gas station, athletic facilities and a chapel	$10,150,088	$7,841,051 (28%)	$19,689,758 (72%)	15 Years
Gas Air/Propane Mixing Plant, Ft. Stewart, GA	Base-wide peak shaving project for propane-air mixing plant	$921,570	$4,042,091 (50.5%)	$3,968,921 (49.5%)	15 Years with a 5 year option
Gas Air/Propane Mixing Plant, Ft. Gillen/McPherson, GA	Base-wide peak shaving project for propane-air mixing plant	$1,052,000	$7,077,969 (71.6%)	$2,811,852 (28.4%)	15 Years with a 5 year option
Ft. Polk, LA	HVAC retrofit in family housing area (4,003 units)				20 Years presently in negotiations; expect award Oct 93
Ft Drum, NY	*Gas distribution system*				Presolicitation notice 22 Jul 93; *response due* 17 Aug 93

- Unrealistic expectations concerning length of SES contract development
- The life cycle analysis is based on the bids and technical evaluation of the bids. It is a projection of the cash flows thought most likely by the government. However, it is dependent on the technical personnel for interpretation of the savings claimed by the contractor. If the technical personnel cannot judge the accuracy of the energy savings claimed by the bidder, then the life cycle analyst must give the bidder credit for savings claimed.
- Reducing government risk due to the difference in energy inflation and general inflation
- Local utility action that can substantially affect the SES project.

(c) In general, the energy savings performance contract method of financing energy projects is an excellent source of alternative funding for the government, specifically, the Department of the Army. It is quite viable when the payback period is short, i.e., 3 to 4 years, when immediate results can be acquired. However, a long-term contract has the advantage of increasing the customer's and contractor's incentive for ongoing project success, since fees are based on performance and energy savings.

(4) **Third Party Contracting.** Third Party Contracting (TPC) is a financing arrangement which permits the government to enter into long-term contracts (up to 30 years) with private companies for the purchase of utility services (e.g., heating, cooling, electric). The contractor designs, builds, owns and operates the facility/plant which provides a service/commodity on government land. The government buys a certain level of this service/commodity and pays for it on a per unit basis at a fixed minimum price. This fixed rate is prenegotiated and is paid to the contractor regardless of whether or not the service is used. For example, if the government agreed to pay a fixed price of $100 per month for electric and used it in months 1, 2, and 3 but did not in month 4, the government is still required to pay $100 per month for months 1, 2, 3 and 4. Likewise, if the government uses more of the service, then the government pays more for it. According to the US Army Corps of Engineers at Huntsville, the Center of Expertise for supporting HQDA for the pursuit of privatization or TPC, TPC is not currently used by the Army to finance energy services, principally because it is not lucrative for either the Army or the contractor.

(5) Demand Side Management

(a) Introduction

1. This paragraph reports the results of CAA's evaluation of the demand side management (DSM) programs which were being offered by the 34 commercial utility companies servicing the 49 Army sites examined in the REEP Study. The survey specifically focused on identifying cash rebate offers made during the time the REEP Study was conducted as inducements for implementing selected ECO measures. Figure F-1 identifies the 34 servicing utilities by study site.

2. The Energy Efficiency Resource Directory: A Guide to Utility Programs, September 1992, prepared for the President's Commission on Environmental Quality, was used for initially identifying servicing utility companies (referred to in following paragraphs as "utilities") which had ongoing DSM programs and program points of contact. Utility DSM program representatives were contacted and asked to provide literature describing the specifics of current DSM program offers. Except where otherwise noted, these utility publications and correspondence comprised the main sources for the information, findings, and conclusions presented in the DSM portion. Telephone conversations with utility DSM program representatives were used, as needed, to supplement information contained in utility publications.

State	Utility company	Army site serviced	State	Utility company	Army site serviced
AL	Alabama Power	Anniston AD Redstone Arsnl Rucker	NC	Carolina Power & Light	Bragg
AR	Ark Power & Light	Pine Bluff Arsnl	MO	Show-Me Power Kansas City Power & Light	L. Wood Lake City AAP
AZ	Tucson Electric Power	Huachuca	NJ	Jersey Central Power & Light	Dix Monmouth Picatinny
CA	Pacific Gas & Elec So Cal Edison	Ord Presidio SF Irwin	NY	Niagara Mohawk Power	Drum Watervliet
CO	Colo Springs Municipal Western Power Admin	Carson Pueblo AD	OK	Public Service Co of OK	Sill
GA	Georgia Power	McPherson Stewart Benning Gordon	SC	So Carolina Elec & Gas	Jackson
IL	Iowa-Ill Gas & Elec	Rock Island Arsnl	TN	TVA	Holston AAP
KA	Kansas Power & Light	Riley Leavenworth	TX	Texas Utilities San Antonio Municipal El Paso Elec Co Central P& L Southwestern Elec Power	Hood Sam Houston Bliss WSMR Corpus Christi Red River Depot
KY	Pennyrile/TVA	Campbell	UT	Western Area Power-17% (DOE) Utah Power & Light	Tooele Depot
LA	LA Power and Light	Polk	VA	Virginia Power Appalachian Power	Eustis Lee Belvoir Walter Reed Radford AD
MA	New England Power	Devens	WA	TACOMA Public Utilities	Lewis
MD	Balt Gas & Electric Potomac Edison	Meade Aberdeen Detrick	WI	Northern States Power	McCoy
MI	Detroit Edison	Detroit Arsnl			

Figure F–1. Servicing Utility Companies Included in DSM Survey

3. The basic methodology used for assessing the potential economic impact of DSM cash rebates upon Army ECO investments was to apply the utilities' current DSM program criteria (as specified in DSM publications) to identify study ECO which qualified for cash rebate offers and the amount of any such rebates. This approach identified the approximate dollar rebate amount which could have been collected by the Army had the study ECO measures been implemented at the study sites at the time the survey was undertaken.

(b) Background

1. A provision of EPACT, which was enacted during the course of the study, permits and encourages governmental agencies to participate in utility DSM programs and prohibits utilities from denying these offers to governmental agencies. Executive Order (EO) 12759, 17 April 1991, directs governmental agencies (including DOD) to remove any impediments to receiving, using, and taking DSM management services, incentives, and rebates which may be offered by servicing utility companies and other private sector energy service providers. In consonance with Task 2 of the REEP Study and pursuant to the provisions of EPACT and EO 12759, CAA evaluated the DSM programs which were being offered by the 34 utility companies servicing the study sites.

2. The purpose for evaluating utility DSM program offerings was to determine:

- Which utilities companies were operating DSM programs offering incentives for implementing energy conservation measures (or ECO);
- Which ECO included in the study would qualify for cash rebates under the criteria specified for these DSM program offers; and
- What was the estimated present year (FY 1993) dollar amount of all such cash rebate offers for all study ECO at all study sites.

3. Although typically DSM programs offered customers a range of incentive packages which included cash rebates, special rates, loans, and free services, the DSM program evaluation was directed at identifying cash rebate offers. The complex terms and procedures governing the application and quantification of incentive packages other than cash rebates rendered them impracticable for a centralized assessment within the scope of the study. Identification of rebates was also limited to offers encompassing retrofit actions/situations. While rebates and other incentives are typically offered for new construction and replacement actions, they were not within the scope of REEP retrofit scenario.

F-5. GENERAL CHARACTERISTICS AND FINDINGS FOR SURVEYED DSM PROGRAMS

a. The primary objective of DSM strategy is to keep pace with customer demand for energy by implementing energy efficiency and conservation measures and forestalling or avoiding the enormous capital investment outlays which would otherwise be required to construct new energy generating plant capacity. A secondary effect of utility DSM programs is the reduced impact on the environment when compared to the alternatives of building more power plants or buying and consuming more power from outside sources (i.e., alternative supply side solution).

b. The level of incentives (rebates, special rates, loans, and free services) that utility companies offer customers as inducements for them to participate in various DSM programs is carefully calculated based upon the cost avoidance savings of deferring large capital outlays for additional plant. In essence, utility companies often find that it is economically preferable to secure cost avoidance savings by sharing a portion of these savings with customers. As could

be expected, the most aggressive DSM programs were found among those utility companies which had energy demand patterns that approached the upper limit of the utility's peak energy generating capacity.

c. While the common objective for all DSM programs was to promote energy efficiency through conservation and load management strategies, the various utility DSM programs aimed at this objective could not be uniformly characterized and assessed. There was found to be a range of factors bearing on the availability, content, and impact of DSM programs nationwide. Since the terms of utility DSM programs were found to be unique in every case, each program was reviewed and assessed individually to identify and gauge the impact of cash rebate offers on study ECO at each site.

d. Some programs were found to be more dynamic than others. Utilities evaluated, revised, and funded these on an annual basis to reflect areas of changing emphasis and emerging technologies. Also, the funding level for some of these programs appeared to have been more closely tied to the utility's annual profit margin and state utility regulators. Other programs were found to be more institutionalized in that they were relatively more stable in scope, funding level, and duration.

e. Representatives for those utilities not operating a DSM program or pursuing one of limited scope informally acknowledged that this was because there was little or no economic incentive at that time due to existing excess plant generating capacity. Some representatives also indicated that while this was the utility's current supply versus demand situation, that the utility had entered into mid– to long–range planning for future DSM programs to assist them in meeting higher energy demands in the future.

f. For surveyed utilities with ongoing programs targeted at commercial/industrial customers, the predominant issues bearing on the scope, content, and impact of the programs were:

- Peak customer demand versus plant peak energy generating capacity
- Customer category/market and level of energy consumption (e.g., commercial, industrial, agricultural, residential)
- Electrical demand pattern (peak versus offpeak consumption)
- End–use of energy (e.g., lighting, heating, cooling, or process)
- Fuel types used by systems (e.g., electricity, gas, renewables)
- Targeted technologies and equipment (e.g., high efficiency HVAC systems and appliances)
- Targeted situations (retrofit, new construction, or replacement)
- System operating efficiency minimums, standards, and targets, and
- Upper limits on total dollar amount of rebate offers to a single customer.

g. Typically, DSM programs were developed and offered by utilities for these five basic customer categories: residential, commercial, industrial, agricultural, and institutional/municipal. These categories are briefly defined below. Since the Army sites addressed in the study fell in the commercial and industrial customer categories, evaluation of rebate offers centered on the programs directed at these two customer categories.

Residential: This classification applies to customers purchasing electric power or natural gas for household use. Households are usually further categorized as single- or multi-family dwellings.

Commercial: This classification applies to customers purchasing electric power or natural gas for use in retail businesses such as retail stores, restaurants, warehouses, and lodging.

Industrial: This classification applies to customers purchasing electric power or natural gas for use in manufacturing businesses, plants, and mining operations.

Agricultural: This classification applies to customers purchasing electric power or natural gas for use in agricultural businesses such as growing crops, raising livestock, and pumping water for irrigation.

Institutional, municipal, and nonprofit: This classification applies to customers purchasing electric power or natural gas for nonresidential businesses not identified elsewhere such as schools, colleges, hospitals, and other institutions.

h. The descriptions of typical DSM programs/services offered by utilities to customers presented in the section were derived from the Energy Efficiency Resource Directory: A Guide to Utility Programs, September 1992, and utility publications. The basic types of incentive programs identified in the survey as typically offered by utilities to commercial and industrial customers are described below.

(1) Prescriptive Rebate Programs. These programs are to encourage commercial and industrial customers to purchase and install energy efficient equipment, typically in the areas of lighting, cooling, heating, refrigeration, and motors. Rebates are offered in a prescriptive format in which the utility pre-selects energy efficiency measures that are economically attractive to both utility and customer. The customer decides which, if any, measures to purchase and install. The utility pays the rebate after proof of ECO installation is provided. The utility often sets minimum efficiency levels for prescriptive measures which exceed local, state, and Federal building codes and standards. Customers often participate in these programs when faced with immediate equipment replacement decisions resulting from equipment failure, obsolescence, or a desire to cut costs through energy efficiency retrofit measures, as was the case scenario for REEP. The amount of some rebate offers was fixed, but in most instances varied according to factors considering system power consumption and energy efficiency levels. An example of a typical fixed prescriptive rebate offer made by Southern California Edison was a flat $20 for each room occupancy sensor the customer installs. Examples of variable prescriptive rebate offers for installing efficient motors by Niagara Mohawk and Baltimore Gas and Electric (BG&E) are presented in Tables F–2 and F–3, respectively. As shown, the amount of rebate offered varies depending upon the size and efficiency of the motor. For larger motors (60 horse power and above), BG&E rebates also depend on the intended end–use of motors. Larger rebate amounts are offered for replacement motors than for plant expansion motors. The additional amount is offered for existing motors as inducement to swapout (retrofit) older, less efficient motors. The increased amount helps the customer defray labor cost and is indicative of BG&E's strong commitment to DSM as a cost effective means of meeting customer energy demands.

(2) Customized Incentive Programs. Utilities offer customer rebates for purchasing and installing energy efficient equipment chosen by customers to meet their unique energy needs. These programs are flexible and tailored to accommodate individual customer-selected energy efficiency measures on a site–specific basis and are generally targeted to nonresidential customers. Because of the diversity among building types and energy end–uses found among nonresidential customers, each participant's customized measures/rebate package is usually unique. Typically, a number of measures are preselected by the customer in consultation with the utility or the utilities' engineering services contractor and approved by the utility. During this process, the utility establishes a rebate offer amount for implementing the custom designed energy package based upon an evaluation of the economic impact upon current and future utility operations. While customized rebate program offers were available at some sites to augment savings from prescriptive rebate program measures, it was not possible to estimate the potential for these rebates because of the customized features of the program. It was observed that the potential customized rebate amount for some sites may be greater than the total amount of potential prescriptive rebates offered for qualifying ECO at the same site.

Table F-2 . Cash Rebates Offered by Niagara Mohawk for Installing High Efficiency Motors

Motor horsepower	Minimum eligible nominal efficiency %	High efficiency motors rebate $
1	84	35
1.5	84	35
2	85	35
3	86	35
5	87	40
7.5	89	60
10	90	80
15	90	120
20	91	160
25	93	200
30	93	240
40	93.6	320
50	94	400
60	94.1	480
75	94.5	600
100	94.5	800
125	95	1000
150	95	1200
200	95.4	1600
250	95.8	2000
300	95.8	2400
350	95.8	2800
400	95.8	3200

Table F-3. Cash Rebates Offered by Baltimore Gas and Electric for Installing High Efficiency Motors

Size (hp)	Minimum Required efficiency	Rebate (TEFC) Replacement motors	Rebate (TEFC) Plant expansion motors	Rebate (ODP) Plant expansion & replacement motors
1	82.5%	$40		$40
1.5	84.0%	$50		$50
2	84.0%	$50		$50
3	87.5%	$70		$70
5	87.5%	$70		$70
7.5	89.5%	$90		$90
10	89.5%	$110		$110
15	91.0%	$150		$150
20	91.0%	$170		$170
25	92.4%	$220		$220
30	92.4%	$260		$260
40	93.0%	$360		$360
50	93.0%	$470		$470
60	93.6%	$550	$490	$300
75	94.1%	$800	$550	$320
100	94.5%	$1100	$890	$400
125	94.5%	$2200	$1500	$530
150	95.0%	$3000	$1600	$730
200	95.0%	$3200	$2000	$1050
250	95.0%	$3400	$2200	$2300

(3) **New Construction Programs**. Utilities typically offered rebates for installation of energy efficiency measures in new nonresidential buildings, most often commercial buildings. New construction offers opportunities to design and install energy efficient measures from the ground up that would be impractical to install in existing structures. To qualify for rebates, energy efficiency of equipment and practices must exceed existing government standards and codes for commercial buildings. In addition to rebates, utilities often provide co–funding for design studies and engineering assistance when building plans are modified to incorporate energy efficient measures.

(4) **Energy Audit Programs**. Utilities offer customers free energy audits conducted by utility personnel or contracted architectural/engineering firms. The purpose of energy audits is to identify energy efficiency opportunities which may exist with regard to facilities, equipment, and processes. If the customer subsequently decides to implement some or all the opportunities, they would likely qualify for a cash rebate under the prescriptive or customized program.

(5) **Maintenance/Tune-Up Programs**. Utilities offer customers incentives to implement relatively low cost tune-up and maintenance measures designed to improve energy efficiency. These generally include such measures as HVAC adjustments, weatherization, motor tune-ups, condenser coil cleaning, fixture cleaning, and low cost lighting measures.

i. Generally, DSM program incentive offers were equally available within the terms of the offer to all utility customers falling within the general customer category. However, in some instances, utilities were found to restrict offers to a more select group of customers falling within the category. For example, one utility limited offers to only hospitals and schools. In another instance, a utility which serviced customers in both Idaho and Illinois limited residential incentive offers to its Idaho customers because the Illinois utility commission declined to approve the offers for Illinois customers.

j. The dynamics of some DSM programs examined during the study were such that it was possible only to gauge the broad economic impact that would result from investment in study ECO. While precise impacts could not be uniformly measured, reasonable estimates of probable cash rebate savings for some ECO measures could be derived. These rebates are conservative estimates supported by detailed examinations of the actual DSM programs which were being operated by the utilities at the time the REEP Study was conducted. Table F–4 identifies the estimated cash rebates by ECO which were found to be available. These estimates were derived solely from prescriptive program offers and exclude additional rebate offers which would be available under customized rebate programs. The total potential rebate estimate of $12,142,000 associated with implementing study ECO is conservative. If all study ECO measures were implemented, the rebate amount which could reasonably be expected to accrue would likely be more than twice this estimated amount if additional rebate incentives offered for customized programs and additional savings accruing from DSM program special rate offers could be considered.

Table F–4. Estimates of Cash Rebates (for the 49 Sites) Resulting from Utility Prescriptive Rebate Offers

ECO	Total rebate offer (K)
2X4 Fluorescent lighting w/electronic ballast	5,471
Compact fluorescent lighting	1,988
Exit lighting	249
Occupancy sensors	341
Motors	1640
Programmable thermostats	245
High efficiency gas furnace	321
Cool storage	1237
Ceiling insulation	31
Window film	20
Blown–in wall insulation	136
Gas heat pump	462
Total	$12,142

k. Generally, prescriptive programs operated by servicing utilities did not include rebate offers for the ECO measures identified below. However, several of these measures would qualify to receive rebates under selected utility customized rebate programs.

- Modular boilers
- Reflective roof membrane
- Water heater blankets
- Nominal efficiency gas furnace
- Flue dampers with electronic ignition
- Manhole sump repairs
- Gas chillers
- Digital control panels

l. Survey findings indicated that the economic impact of ongoing DSM programs would serve to make an Army energy efficiency investment package more economically attractive than is portrayed by the overall study results presented in Chapter 3. Conservatively estimated, additional Army cost savings (the term "cost savings" is used here to denote the impact of cash rebates since they were considered as eventual dollar offsets to ECO investments) of $12.1 million, above the savings levels identified for the base case in Chapter 3, would accrue from utility DSM programs. This added cost savings would be substantially higher if the savings impacts of customized rebate and special rate offers were considered.

APPENDIX G

SPONSOR'S COMMENTS

DEPARTMENT OF THE ARMY
ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
600 ARMY PENTAGON
WASHINGTON DC 20310-0600

DAIM-FDF-U (11-27) 29 DEC 1993

MEMORANDUM FOR THE DIRECTOR US ARMY CONCEPTS ANALYSIS AGENCY, ATTN: CSCA-FSR(5-5d), 8120 WOODMONT AVENUE, BETHESDA, MARYLAND 20814-2797

SUBJECT: Renewables and Energy Efficiency Planning (REEP) Study

1. Reference memorandum, CSCA-FSR(5-5d), 2 November 1993, SAB.

2. Referenced memorandum requested us to evaluate, review, and comment on the REEP study draft report.

3. Enclosure 1 is a completed evaluation of the REEP report as requested by your office and required by AR5-5.

4. My point of contact for this action is Qaiser Toor, DAIM-FDF-U, COMM (703) 355-2026, DSN 345-2026.

Encl

JOHN H. LITTLE
Major General, GS
Assistant Chief of Staff
for Installation Management

STUDY CRITIQUE

(This document may be modified to add more space for responses to questions.)

1. Are there any editorial comments? No If so, please list on a separate page and attach to the critique sheet.

2. Identify any key issues planned for analysis that are not adequately addressed in the report. Indicate the scope of the additional analysis needed. None

3. How can the methodology used to conduct the study be improved?

No change

4. What additional information should be included in the study report to more clearly demonstrate the bases for the study findings? No change

5. How can the study findings be better presented to support the needs of both action officers and decisionmakers? No change

6. How can the written material in the report be improved in terms of clarity of presentation, completeness, and style? No change

STUDY CRITIQUE (continued)

7. How can figures and tables in the report be made more clear and helpful?
No change

8. In what way does the report satisfy the expectations that were present when the work was directed? Report provides excellent and very useful documentation of the REEP Study.

In what ways does the report fail to satisfy the expectations?

None

9. How will the findings in this report be helpful to the organization which directed that the work be done? The analytical capability developed and demonstrated in the REEP Study significantly enhances HQDA leadership's ability to manage the Army's energy program and policy.

If they will not be helpful, please explain why not.

Not applicable

10. Judged overall, how do you rate the study? (circle one)

Poor Fair Average Good Excellent

A landmark piece of work!

APPENDIX H

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GLOSSARY

ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AMCCOM	Ammunition and Chemical Command
AR	Army regulation
ASAILE	Assistant Secretary of the Army for Installations, Logistics, and Environment
BRAC	Base Realignment and Closure
CAA	US Army Concepts Analysis Agency
CENET	US Army Corps of Engineers National Energy Team
CERL	US Army Construction Engineering Research Laboratory
CONUS	continental United States
DOD	Department of Defense
DOE	Department of Energy
DSM	demand side management
ECAM	Energy Conservation and Management Program
ECIP	Energy Conservation Investment Program
ECO	energy conservation opportunity (ies)
EPACT	Energy Policy Act of 1992
EO	Executive Order
FOMOA	Force Modernization Analyzer
FY	fiscal year
GOCO	government-owned, contractor-operated
GSA	General Services Administration
HQDA	Headquarters, Department of the Army
HVAC	heating, ventilation, air conditioning
IAW	in accordance with
kW	kilowatt(s)
LCC	life cycle cost
LSCIP	Labor-Saving Capital Investment Program
MACOM	major Army command
Mbtu	million British thermal units
MCA	Military Construction, Army
MILCON	military construction
MOF	model objective functions
NPR	National Performance Review
OMA	Operations and Maintenance, Army
OPA	Other Procurement, Army
OSD	Office of the Secretary of Defense
OSL	Optimization Subroutine Library
PAA	Procurement of Ammunition, Army
PCIP	Productivity Capital Investment Program
PECIP	Productivity Enhancing Capital Investment Program
PIF	Productivity Investment Funding
PIP	Product Improvement Program
PPBES	Planning, Programming, Budgeting, and Execution System
QRA	quick reaction analysis
QRIP	Quick Return of Investment Program
RDA	Research, Development, and Acquisition
REEP	Renewable and Energy Efficiency Planning (REEP) Study
REESIN	Renewables and Energy Efficiency Sustainable Investment (REESIN) QRA

RIM	REEP Investment Model
SEER	Seasonal Energy Efficiency Rating
SERDP	Strategic Environment for Research and Development Program
SES	Shared Energy Savings
STON	short ton
TOA	total obligational authority
US	United States
USC	United States Code